The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

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W. D. CALLENDER, President GEO. P. MILLER, Treasurer
N. C. ROCKWOOD, Vice-President C. O. NELSON, Secretary

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Volume 25 April 8, 1922 Number 7

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What's Coming

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1/3 more per dollar

35 EXTRA STICKS AT NO EXTRA COST

A Guncotton-Nitroglycerin Dynamite Without a Headache

NITROGLYCERIN DYNAMITE has always been the standard high explosive. Until recently it has always had two defects, relatively unimportant in comparison with its basic advantages over other types of dynamite, but nevertheless marked disadvantages. First, it froze at a relatively high temperature, and second, it caused headaches.

Within the past year, the first of these disadvantages was removed through the production of a Du Pont Straight Dynamite which functions with normal efficiency at 10° below zero.

Both disadvantages have now been removed in Dumorite—a guncotton-nitroglycerin dynamite, which is not only absolutely non-freezing but is the first dynamite with nitroglycerin content which will not cause headaches.

Under ordinary conditions, Dumorite does approximately the same work as 40% dynamite stick for stick. And you can buy 135 to 140 sticks of Dumorite at the same price as 100 sticks of "40%."

Dumorite is saving money today for operators in most kinds of blasting work. If it is adapted to your work, your dynamite dollar will be worth $1.35.

Write our nearest branch office outlining your requirements and put the problem of reducing your blasting costs up to our Service Department.

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Pittsburgh, Pa.
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Spokane, Wash.
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Du Pont Products Exhibit
Atlantic City, N. J.

E. I. du Pont de Nemours & Co., Inc.
Explosives Department
Wilmington, Delaware

NON-HEADACHE DU PONT **NON-FREEZING**

DUMORITE

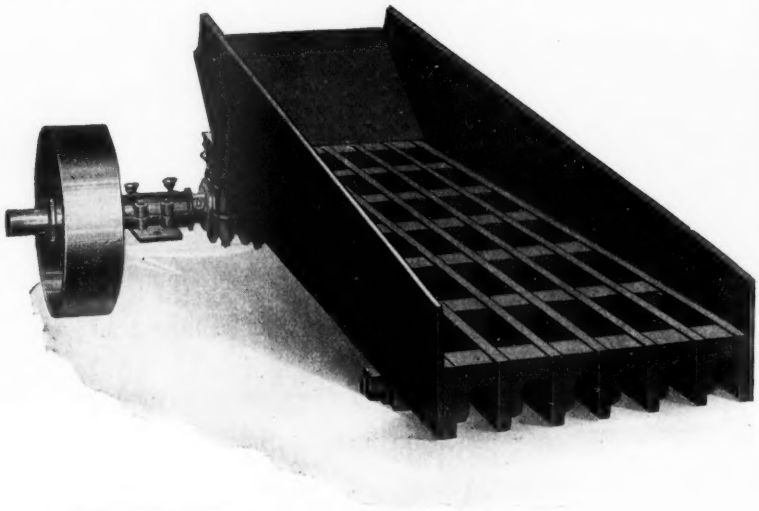
—ENDURINGLY EFFICIENT—

TRAYLOR BULLDOG CRUSHERS

ARE HUNGRY BRUTES

AND IF NOT CAREFULLY WATCHED WILL GORGE THEMSELVES TO A STATE OF TORPIDITY

THE TRAYLOR BULLDOG GRIZZLEY FEEDER IS THE REMEDY



THE SELECTIVE, REGULATING ACTION OF THIS FEEDER CURBS THE RAVENOUS APPETITE OF THE CRUSHER BY DELIVERY OF A STEADY FLOW OF MATERIAL, OF JUST THE RIGHT QUANTITY.

THE RESULT

NO BRIDGING, NO CHOKING WITH FINES

AND CONSEQUENTLY

ECONOMY OF POWER—

INCREASED CAPACITY—

REDUCTION OF LABOR COST

YOUR CRUSHER NEEDS A BULLDOG FEEDER

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CHICAGO 1414 Fisher Bldg.
LOS ANGELES Citizens Nat'l Bank Bldg.
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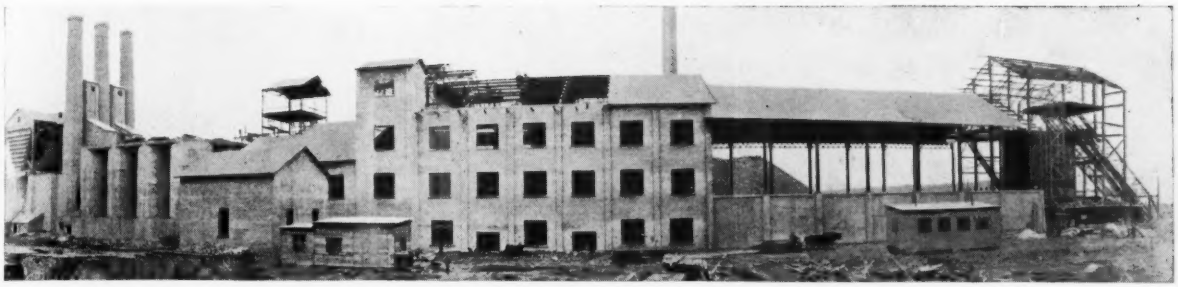


Reduce Operating Costs

In these highly competitive times *the modern plant* with its low operating costs and waste elimination has a decided advantage. Many manufacturers have found worth-while profits in a plan that called for the complete tearing down of old buildings and the erection of new structures with modern equipment and low cost production methods. Plant modifications have also resulted in competitive advantages.

The plant shown above is one example of Austin ability to perform on large and complex building operations. Nearly 50 years' experience in practically every industrial field both in America and eighteen foreign countries can be brought to bear upon your building problems. Phone, wire or use the coupon. Consultation involves no obligation.

Beside this mammoth plant built for the La Salle Portland Cement Company at La Salle, Illinois, The Austin Company has recently completed plant buildings for the Western States Portland Cement Company, Independence, Kan. The California Portland Cement Company, Colton, California, have also been served recently by the Austin Company.

RESULTS NOT EXCUSES

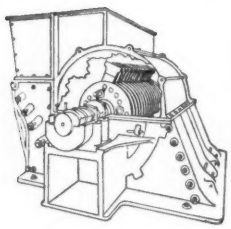
THE AUSTIN COMPANY, Cleveland
Industrial Engineers and Builders
CHICAGO DETROIT PITTSBURGH PHILADELPHIA
NEW YORK DALLAS ST. LOUIS
THE AUSTIN CO. OF CALIFORNIA, LOS ANGELES

AUSTIN

ENGINEERING
BUILDING
EQUIPMENT

R. P. 4-8-22 **THE AUSTIN COMPANY, Cleveland**
Gentlemen: We are interested in improved crushing plant production and would be pleased to have your suggestions without obligation.
Firm.....
Individual.....
Address.....

When writing advertisers please mention ROCK PRODUCTS



"This crusher is taking 36 inch cube stone, fed with a 48 inch Steel Pan Conveyor, and breaking it to 1½ inch or finer, with a minimum of fines (as we sell our limestone for macadam purposes.)"
John Herzog & Sons, Forest, Ohio.

"The rock as it comes from our quarry, runs from 36 inch cubes to spalls, and we crush from 60 to 75 tons per hour. 75% of the rock is crushed to powder and 25% to 1½ inches and smaller."
San Antonio Portland Cement Co., San Antonio, Texas.

One Operation Crushes 3 foot stone to 1½ inch.

When a crusher can operate on 24 to 1 ratio, all past standards and costs of stone reduction become obsolete. This is exactly what is happening in connection with the Williams mammoth crusher.

It is reducing 2 man hard limestone to 1½ inch, with a minimum of fines, in one operation—completely replacing 2 or 3 intermediary crushers, besides elevators, screens and other equipment.

For example; in a typical stone crushing plant one Williams installation has taken the place of 1 jaw crusher and 3 gyratories, eliminating numerous conveyors and elevators, and reducing upkeep and operating costs in proportion.

It is taking soft limestone from 36 inch cubes to spalls, and crushing 75% of it to powder, for cement purposes, in one operation.

The service records of the Williams mammoth, are available to any engineer or executive. The evidence is remarkable. Write today.

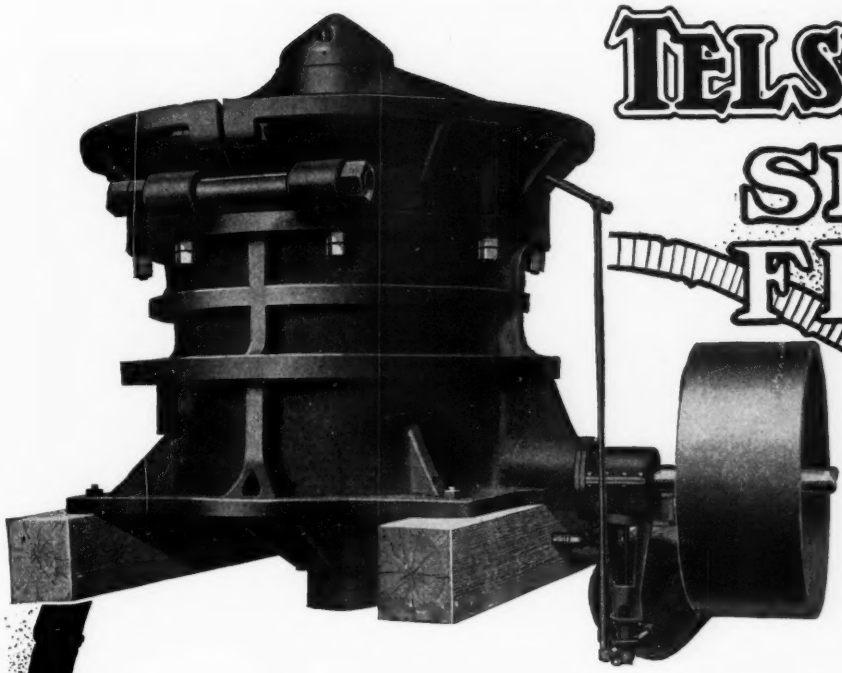
Williams Patent Crusher & Pulverizer Company
800 St. Louis Ave., St. Louis, Mo., U. S. A.
Chicago, 37 W. Van Buren St. New York, 15 Park Row San Francisco, 67 Second St.

THE WILLIAMS PATENT CRUSHER & PULVERIZER CO. ST LOUIS MO U.S.A. TRADE MARK

Williams

PATENT CRUSHERS GRINDERS SHREDDERS

When writing advertisers please mention ROCK PRODUCTS



TELSMITH'S SHORT FRAME!!!

It's a No. 7½ Telsmith Primary Breaker, with a demonstrated capacity of 150 tons per hour—quite a machine. It has two receiving openings (each 14 x 70 in.), a concave area of 4999 sq. in. and a head area of 3925 sq. in. And yet it measures just 5 ft. 2⅞ in. from sills to rim of crown.

It weighs only 25 tons; and yet, per inch of height, it is the heaviest 14-in. gyratory on the market. The shaft is unbreakable. The frame and crown are more nearly proof against tramp iron than any other machine you can buy.

These statements are not mere idle assertions. Behind this ad are fifteen years of study, hard work and development in the crusher field. Telsmith is ***right***—the best crusher buy on the market. Don't make up your mind about rock crushers until you have given Telsmith a chance. That's all we ask—a chance. Glad to send you, without obligation, our Catalog No. 166 (Telsmith Primary Breaker) and Bulletin No. 2-F-11 (Telsmith Reduction Crusher).

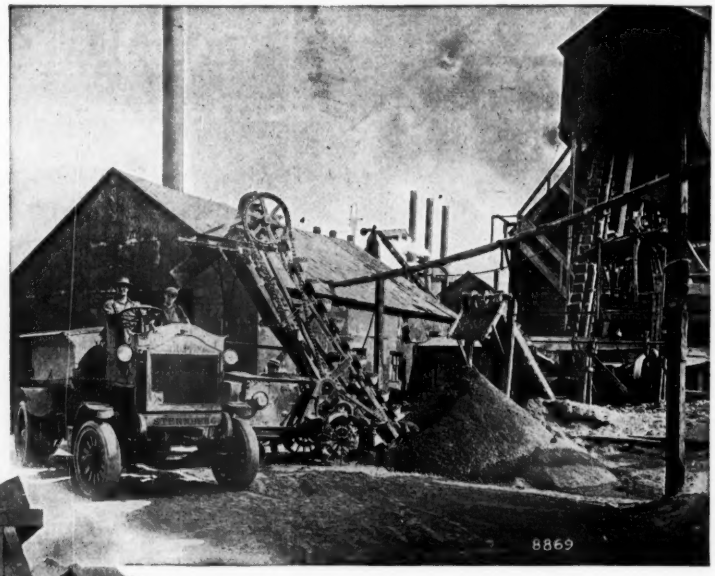
SMITH ENGINEERING WORKS

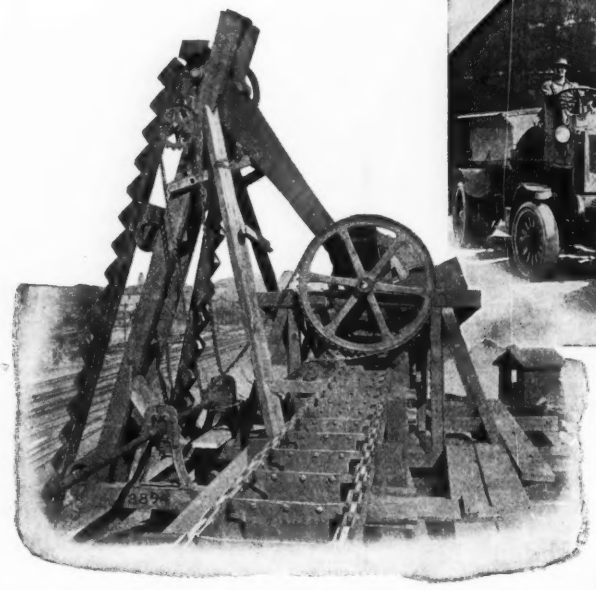
Locust Street, Milwaukee, Wis.

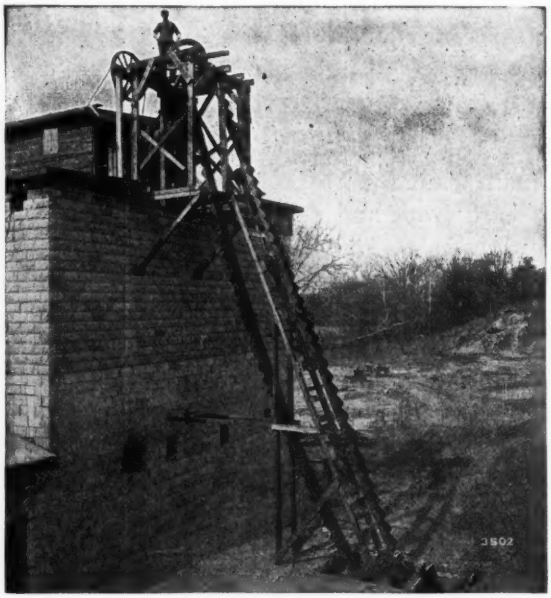
Old Colony Bldg., Chicago, Ill.
50 Church St., New York City
806 Otis Bldg., Philadelphia, Pa.
261 Franklin St., Boston, Mass.
110 W. Park Way, Pittsburgh, Pa.
325 W. Main St., Louisville, Ky.
6110 Euclid Ave., Cleveland, Ohio
Brunson Bldg., Columbus, Ohio
Franklin & Channing Aves., St. Louis, Mo.
2540 University Ave., St. Paul, Minn.
207 W. Third St., Des Moines, Ia.
Bowman Machy. Co., Omaha, Nebr.
25 Market St., San Francisco, Calif.
Salt Lake Hardware Co., Salt Lake City, Utah
Road Builders Equipment Co., Portland, Ore.

Upper illustration: In the background a Jeffrey Standard Bucket Elevator is handling material to screens over bins, and a Portable Bucket Loader is handling sand from ground storage to motor truck.

Lower illustration: Head of a Jeffrey Standard Bucket Elevator discharging material into a revolving screen, the product then being carried by a Jeffrey Scraper Conveyor to the bins.







Jeffrey Standard Bucket Elevator carrying sand and gravel to screen over bins.

Jeffrey Machinery Equipment Includes:

Portable Belt Conveyors.
Radial and TANKTRED Types Portable Bucket Loaders.
Elevators and Conveyors for handling all kinds of materials.
Industrial Locomotives.
Swing Hammer Pulverizers for reducing limestone for Road Building Purposes.

When Time Is Money—

a Jeffrey Standard Bucket Elevator can be quickly installed to handle sand, gravel, crushed stone, etc.

It is a wonderful help to a builder securing a contract, where time is a big factor, to be able to quickly install his equipment for handling sand, gravel and crushed stone.

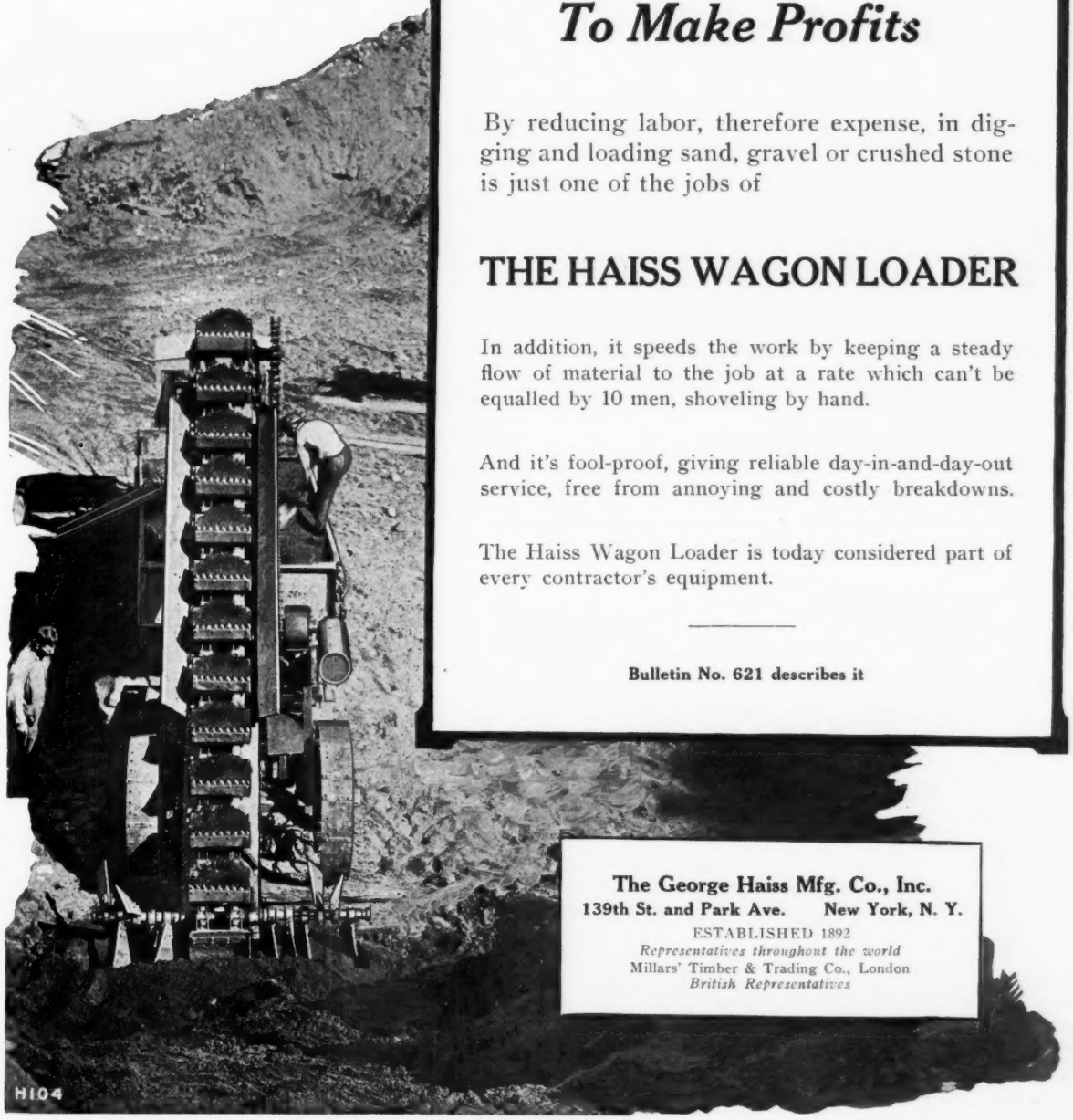
Jeffrey Bucket Elevators are standardized. Through experience acquired in the installation of various successful types of material handling machinery for all classes of material in every field of industry, we have been able to so thoroughly standardize Jeffrey elevators that specifications are reduced to a few brief points.

By consulting our Catalog No. 244-E—which every contractor should have on file, as it is gladly sent on request—the builder simply advises us the material to be handled, the centers, type and capacity desired. In a brief time his equipment is on the way, a big saving in time.

The Jeffrey Manufacturing Co.

935-99 North Fourth St. Columbus, Ohio

JEFFREY
MATERIAL HANDLING MACHINERY



Helping the Contractor To Make Profits

By reducing labor, therefore expense, in digging and loading sand, gravel or crushed stone is just one of the jobs of

THE HAISS WAGON LOADER

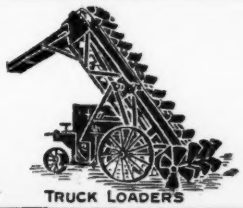
In addition, it speeds the work by keeping a steady flow of material to the job at a rate which can't be equalled by 10 men, shoveling by hand.

And it's fool-proof, giving reliable day-in-and-day-out service, free from annoying and costly breakdowns.

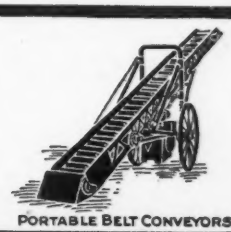
The Haiss Wagon Loader is today considered part of every contractor's equipment.

Bulletin No. 621 describes it

The George Haiss Mfg. Co., Inc.
139th St. and Park Ave. New York, N. Y.
ESTABLISHED 1892
Representatives throughout the world
Millars' Timber & Trading Co., London
British Representatives



HAISS
MATERIALS-HANDLING EQUIPMENT
CLAM SHELL BUCKETS



SHOPE BULLETIN

VOL. I April 8, 1922 Number 16

Recognition—

Have you received a copy of the magnificent "broadside" sent out by the Alpha Portland Cement Co., containing an engraving in full color of a row of Shope Concrete Bricks?

This engraving portrays with exceptional fidelity, the color, tone and texture that can be given Concrete Brick by the Shope Patented Process; and if you will let your imagination run beyond the few samples shown, you can see limitless artistic possibilities in the manufacture of this product.

The "broadside" also shows engravings of a few buildings built of Shope Brick—beautiful structures, beautiful in design as well as material, though the engravings printed in black do not tell the story of color values so well as the color plates.

This is the first time a cement company has advertised a specific Concrete Brick. The Alpha Company recognize the fact that, so far as Concrete Brick is concerned, the Shope is the ultimate. They know The Shope Patented Process makes possible a Concrete Brick that throws the clay product into the discard.

Remember, you have no competition in your territory when you manufacture this product

Shope Brick Company

361 East Morrison Street **Portland, Oregon**

LICENSEES:

The Miles Co.—Salem, Ore.
Eugene Concrete Co.—Eugene, Ore.
Wastenburg Brick Co.—Klamath Falls, Ore
Arizona Shope Concrete Brick Co.—Phoenix, Ariz.
Florida Nu-Tex Brick Co.—109 Water St., Tampa, Fla.
Texas Shope Brick Co.—3056 Sumpter Bldg., Dallas, Tex.
Birmingham Slag Co.—Birmingham, Ala.
Shope Brick Co. of Wisconsin—50th and State Sts., Milwaukee, Wis.
The Polychrome Cement Brick & Tile Co.—Carter-Cotton Bldg., Vancouver, B. C.
Dark Canyon Stone Co., H. W. Jones, Mgr., Rapid City, S. D.
Warren Sand & Gravel Co.—Easton, Pa.
Penn Shope Brick Co.—Reading, Pa.
Lycoming Shope Brick Co.—Williamsport, Pa.
Shope Brick Co.—Portland, Ore.
Rustic Brick & Supply Co., Palette Rd., Ford City, Ont., Can.
Puyallup Shope Brick Co.—Puyallup, Wash.
The Shope Brick Co.—Springfield, Mass.
Utah Shope Brick Co., P. O. Box 632, Salt Lake City, Utah
Decoration Brick Co.—1565 N. Lake Ave., Seattle, Wash.

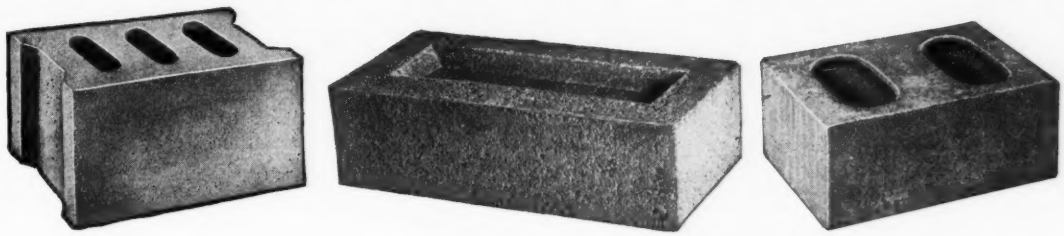
These licensees are all successful manufacturers

The BESSER

Turn Your Sand and Gravel Piles Into REAL Money

Make TWO Profits by Manufacturing Concrete

BLOCK, BRICK *and* TILE



BESSER Concrete Products Machinery turns your raw by-products and rejects into finished concrete products that bring you **real** money. The Automatic BESSER Machines require the least amount of labor and produce the highest quality block, brick or tile in quantities that defy competition. Not only do they thus assure you the largest profits but the reputation of Besser-made concrete units, together with the lower prices you are able to quote, means a **sure** contract almost every time.

Everybody comes to BESSER in the end—they can't stand BESSER competition. Why not start right—with a BESSER? Let our engineers figure with you.

Ask us today

BESSER SALES COMPANY

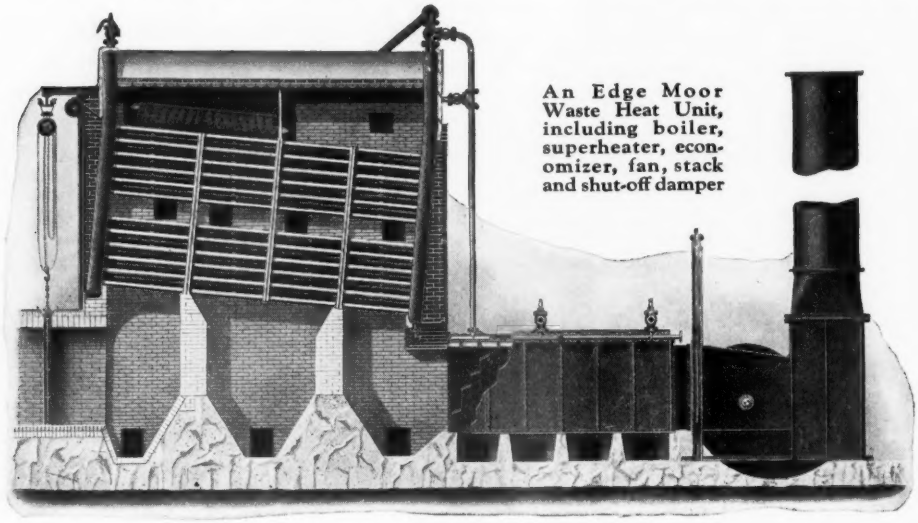
Complete Equipment for Concrete Products Plants

349 Monadnock Building **Chicago**

Better Own a

Than Compete With One

The Asano Portland Cement Company Utilizes the Heat of Waste Gases with The Edge Moor Waste Heat System



An Edge Moor Waste Heat Unit, including boiler, superheater, economizer, fan, stack and shut-off damper

The thoroughly modern mills of the Asano Portland Cement Company, Japan, obtain their steam power by means of Edge Moor Waste Heat Boilers.

In the Kawasaki Plant, two boilers of 734 H. P. each are installed; in the Formosa Plant, there is one 684 H. P. Boiler. Both installations include the special Green Fuel Economizers and fans and Foster superheaters, furnished only with the Edge Moor Waste Heat System. The fans are motor driven. Both plants were installed in 1921.

Other Edge Moor Waste Heat installations in Far East cement mills include two 740 H. P. boilers at the Hokoku Cement Company, Kiushu, Japan, and one 805 H. P. boiler recently shipped to the National Development Company, Cebu, P. I. for the new national cement mill which this organization is building under the auspices of the Philippine Government. The latter installation includes one 306 H. P. direct fired Edge Moor Boiler with stoker and superheater.

Among the cement mills in this country equipped with Edge Moor Waste Heat Systems are those of the Marquette Cement Manufacturing Co., Oglesby, Ill.; Alpha Portland Cement Co., Alsen, N. Y., and Martins Creek, Pa.; Northwestern States Portland Cement Co., Mason City, Ia.; and the Petoskey Portland Cement Co., Petoskey, Mich. The last named is the first wet process mill operated entirely by waste heat power.

Edge Moor Waste Heat Systems open a new avenue of economy to the cement mill, about which we shall be glad to give you details.

EDGE MOOR IRON COMPANY

Established 1868

EDGE MOOR, DELAWARE

New York *Boston* *Chicago*
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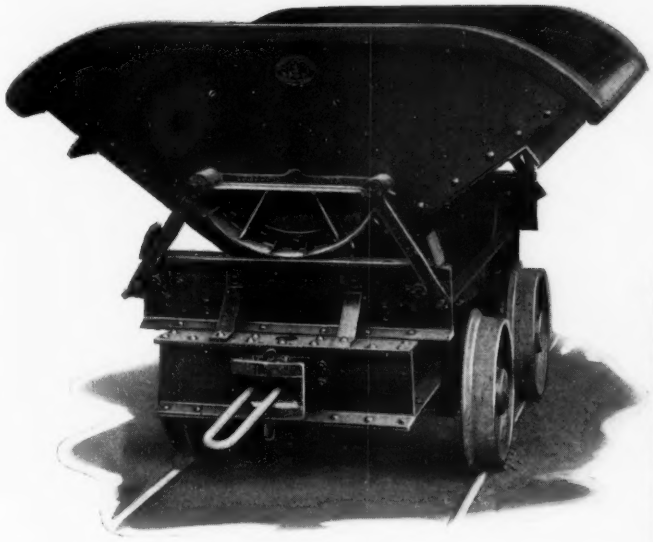

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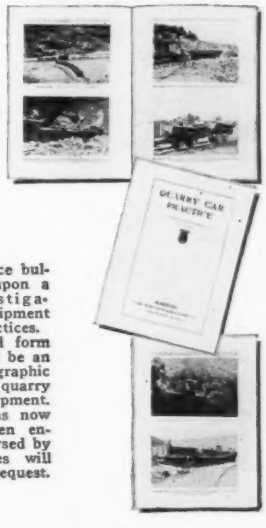

Quarry Car Practice bulletins are based upon a countrywide investigation of quarry equipment and operating practices. In their completed form these bulletins will be an authentic photographic record of actual quarry operation and equipment. The three bulletins now available have been enthusiastically endorsed by quarrymen. Copies will be sent you on request.

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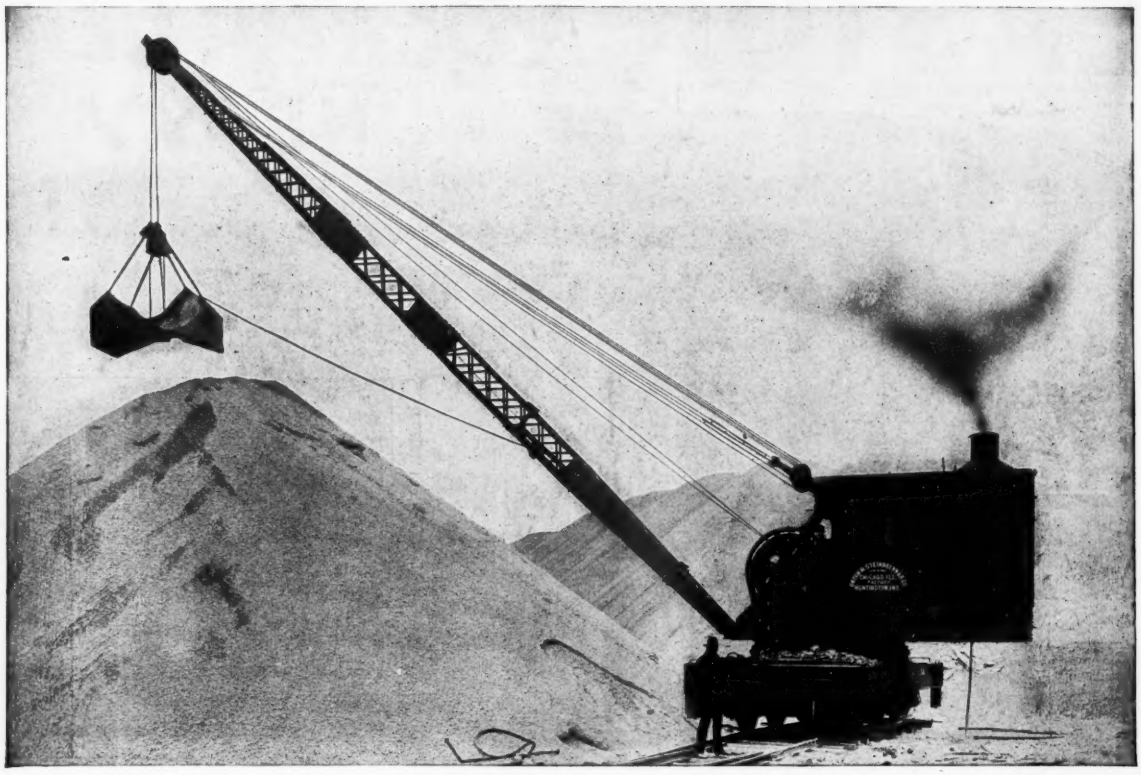

30-TON CRANE
With 60-ft. boom and 2-yd. bucket

O. S. DEPENDABLE

LOOK at the problem squarely—Some day you will use O-S-Dependable Cranes and Grab Buckets and forever after you will be a defender of their merits.

The material handling machinery made by Orton and Steinbrenner Co. is not "just suitable." It is unsurpassed for simplicity and accessibility. The quality of the material and workmanship insures a rare economy of performance.

Our booklet on this subject is profusely illustrated with photos of our cranes on the job and contains a world of information concerning details that are far beyond the space limitations of this advertisement.

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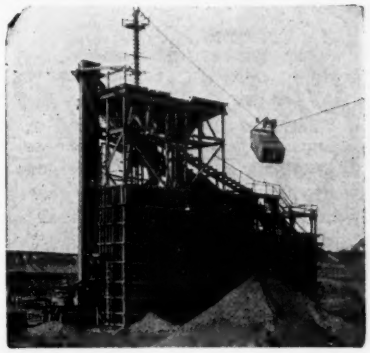
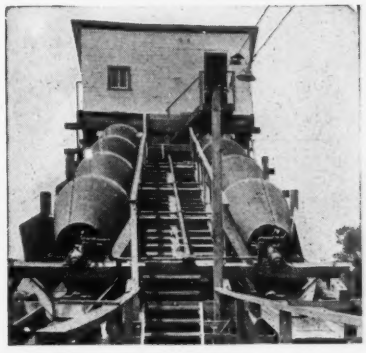
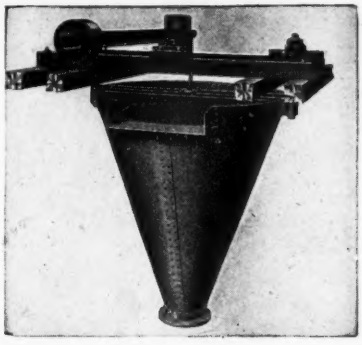
LINK-BELT

Sand and Gravel Plants and Accessories





Complete sand and gravel washing plant. Dull Inclined Conical Screens and Drag Line Excavator Bucket in operation. Our catalog illustrates and describes some of the many plants we have designed. Send for a copy.



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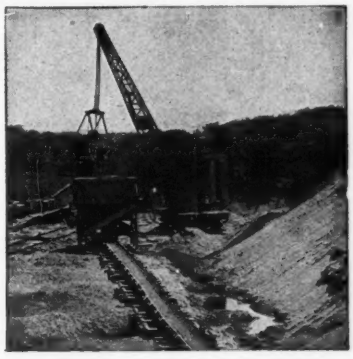
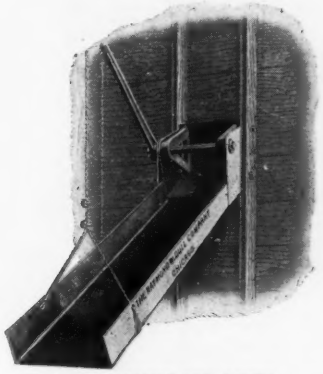
We were the first to design a mechanically-acting separator and through successful improvements have developed a perfectly practical and thoroughly reliable machine.



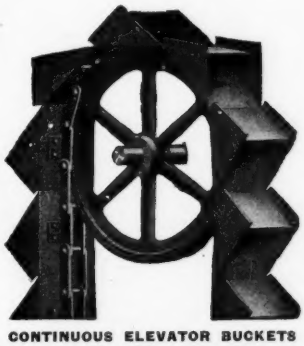
LOCOMOTIVE CRANE DELIVERING TO BELT CONVEYOR

The belt conveyor is fed by the standard Link-Belt crane shown equipped with grab-bucket used for excavating sand and gravel.



LOADING SPOUTS AND GATES

For loading out from the bins we provide segmental gates of types suited to the gravel and the sand, with spouts hinged for raising and lowering under control of counter-weights.



CONTINUOUS ELEVATOR BUCKETS

Our catalog No. 213-A fully illustrates and describes our many types of Elevators and Conveyors for Sand, Stone and Gravel.

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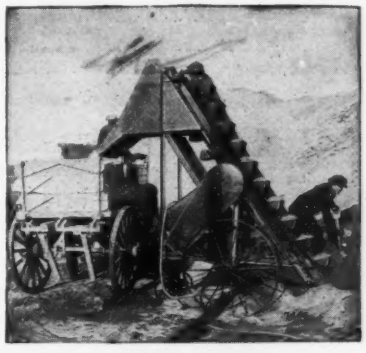
248-A



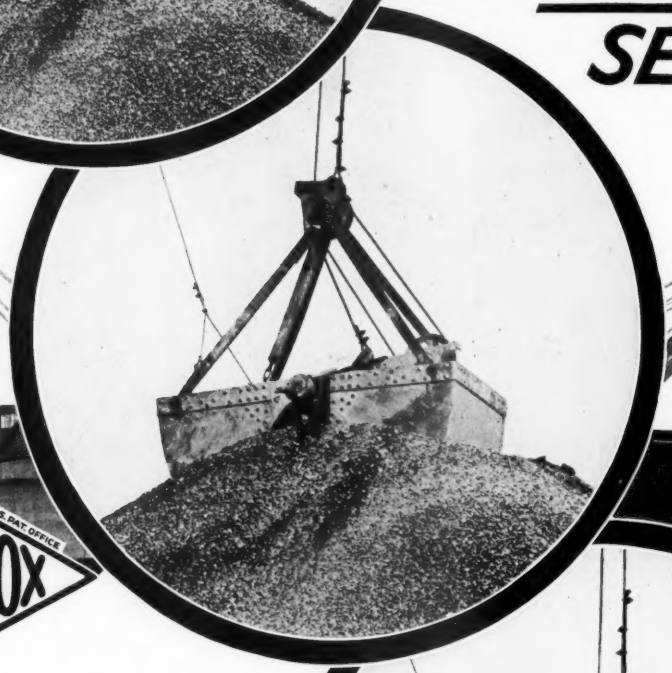
WAGON LOADER

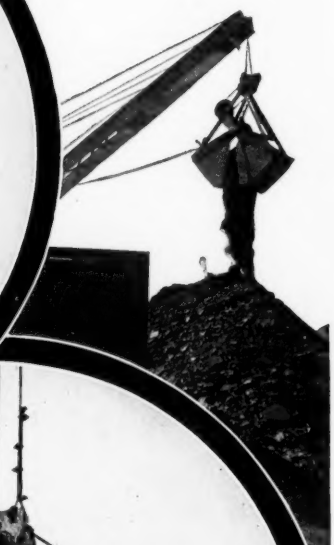
Loads a ton of loose material — sand, stone, gravel, etc., a minute. Catalog No. 450.

SPEED

one-two-three and dump!

THAT'S SPEEDSTER SERVICE





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BLAW-KNOX SPEEDSTER BUCKETS

A SPEEDSTER equipped crane—working in coal, sand, gravel or similar loose bulk materials—will unload more material per hour than any other combination of re-handling equipment.

A full capacity load at every bite—tremendous closing power, and exceedingly quick dumping action. These are the features which make the SPEEDSTER the bucket unexcelled for speedy and economical rehandling purposes.

A variety of sizes enables us to furnish the exact type of SPEEDSTER suitable for your hoisting equipment.

Equip your crane with a SPEEDSTER—make your re-handling system 100% efficient.

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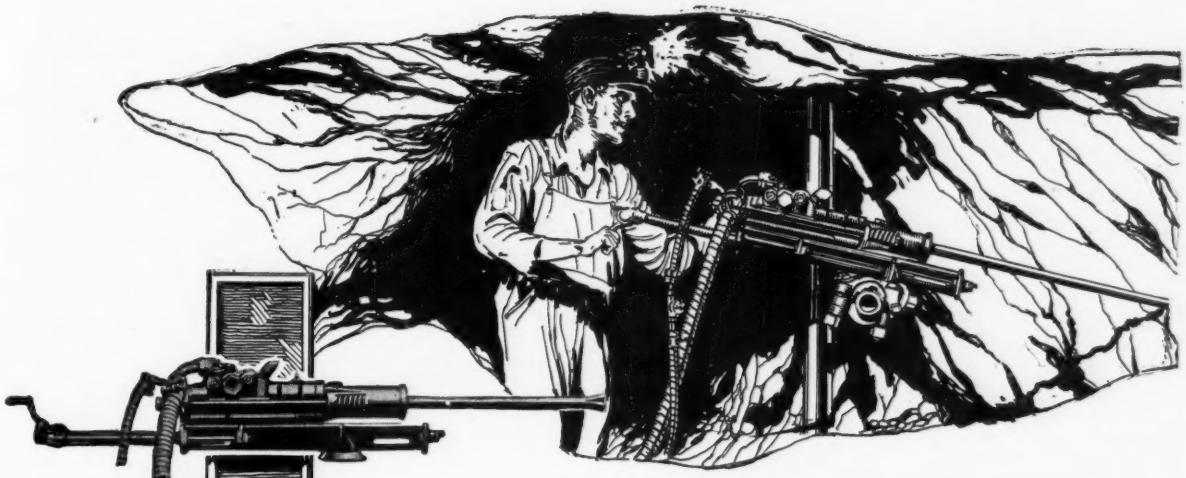

A Drill for Every Job

The Ingersoll-Rand Company manufactures a very wide variety of rock drills from the little 21½ lb. BAR-33 "Jackhamer" for light work around industrial plants to the large 1250 lb. K-64 Submarine Drill—and everything in between.

Each of the many machines is designed for a specific duty and the entire range of drills covers every phase and type of rock drilling.

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It will pay you to get the right drill for your job and to remember that I-R makes a drill for every job.

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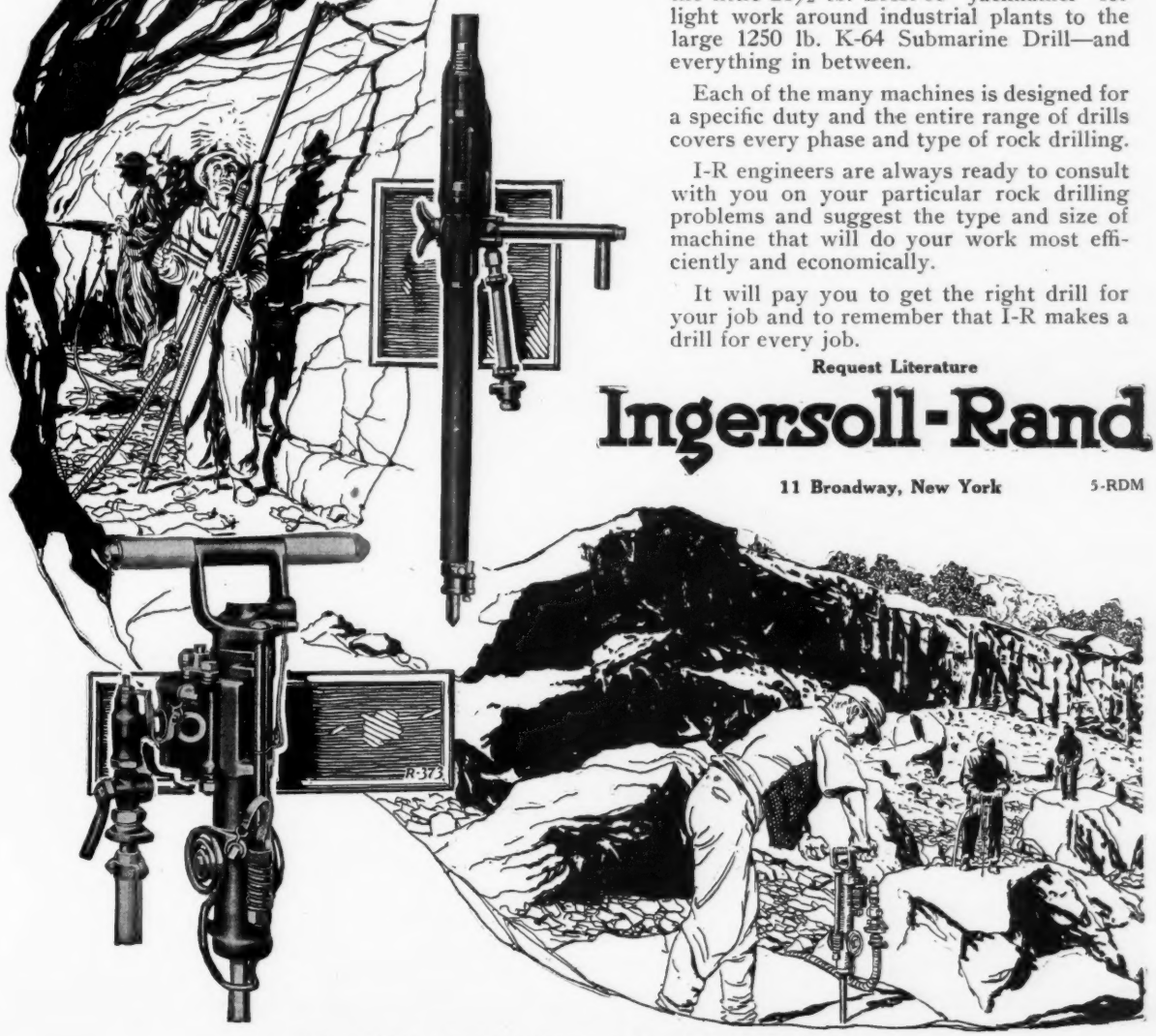

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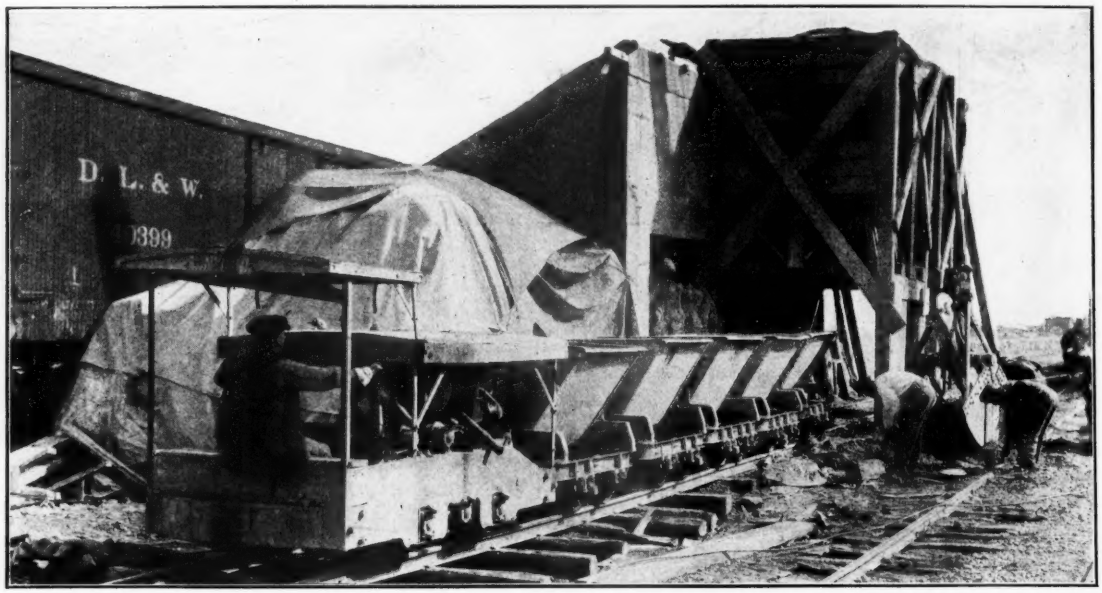

Plymouth Locomotive in Equipment of J. A. Mercier, Detroit, Mich.

The Utility of the Plymouth Locomotive

In any constructive enterprise of magnitude, horse or mule haulage has been abandoned. Even the truck is not equal in capacity to the PLYMOUTH Locomotive if track can be laid.

Above shows the PLYMOUTH receiving its load at the apportioning plant of J. A. Mercier, on big sewer contract in Detroit, and where it kept the work in continuous progress to the satisfaction and profit of the contractor.

When your contract involves a haulage problem always query us for literature and general information. We will be pleased to go into detail as intimately as if your problem was ours.

The Fate-Root-Heath Company
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PLYMOUTH
Gasoline Locomotives

When writing advertisers please mention ROCK PRODUCTS

Rock Products

Volume XXV | Chicago, April 8, 1922 | Number 7

Indiana Portland Cement Company Enlarges Its Plant

A Second Kiln, 10 Ft. Wide and 240 Ft. Long, Has Been Added, Thus Doubling the Capacity of the Greencastle, Indiana, Plant

THE main feature of the 1921 activities of the Indiana Portland Cement Co., Greencastle, Ind., was the completion of the new unit added to this plant, consisting of a 10x240-ft. kiln and the necessary equipment. This new equipment was put in operation in May of last year and has thereby raised the company's plant capacity to 75,000 bbl. of cement monthly. The original plant was described in the January 3, 1920, issue of ROCK PRODUCTS. With this addition the company has not only a modern, well-equipped plant, but it has a plant that can meet the demand made upon it by the territory in which the plant is situated.

ing any of the existing machinery—in fact, some of the departments were merely enlarged to take care of the increased capacity.

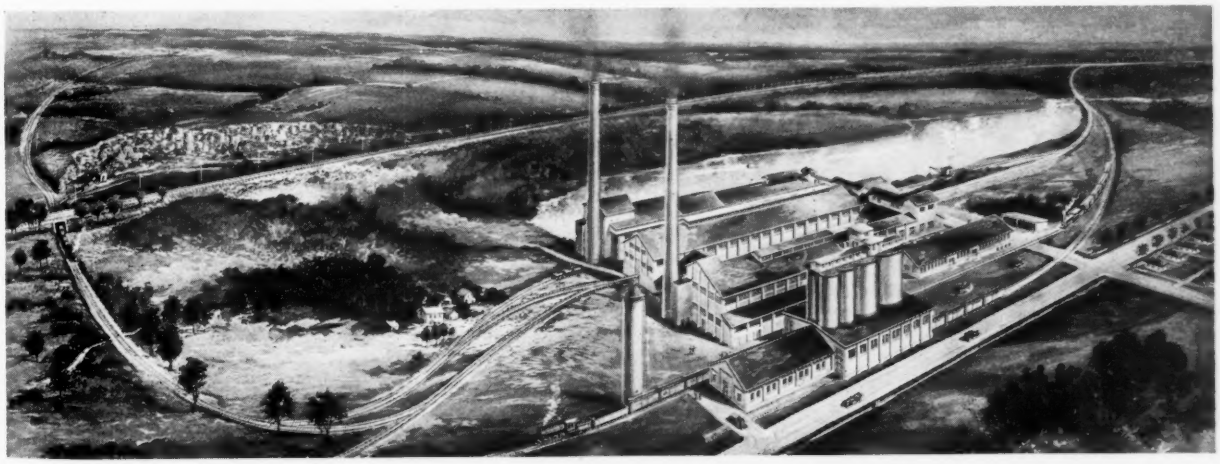
To secure the proper mix for the slurry (this plant operates under the wet process), limestone, clay and cinders are used. The limestone is obtained from a quarry on the plant site, the clay being the overburden, while the cinders are purchased from a local traction company. Cinders are used to obtain the necessary alumina content that is required for cement.

The company owns 500 acres of quarry land on the plant site, the land having a slight overburden which is removed by a Thew shovel with a ¾-yd. dipper. For blast holing a well drill is employed, and for loading the stone into the quarry cars two steam shovels, a 70-C and a 40-C Bucyrus, are used. The 34 quarry cars each have a capacity of 6 yd. The rock and clay are hauled by locomotives to the raw-material storage building.

Raw-Material Storage

No alterations were necessary for the raw-material building, located between the two kilns, as its capacity was sufficient to take care of the additional kiln. This building is entirely housed. It has a storage capacity of 1500 tons of clay, 1600 tons of shale, 5600 tons of limestone, 1000 tons of cinders, 1400 tons of coal, 310 tons of gypsum, and 56,000 bbl. of clinker. The building was originally constructed with 10-ton overhead electric traveling crane equipped with 3-yd. clamshell bucket. This crane handles all of the raw materials in the storage from the various compartments to the feeding hoppers. With the increased capacity, however, a 10-ton Whiting crane with a grab bucket has been added.

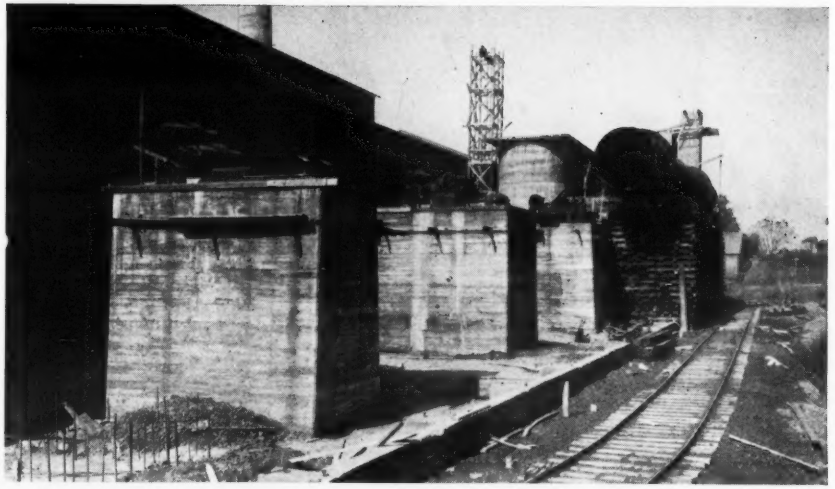
The limestone is brought to the raw-material storage building with a 22-in.

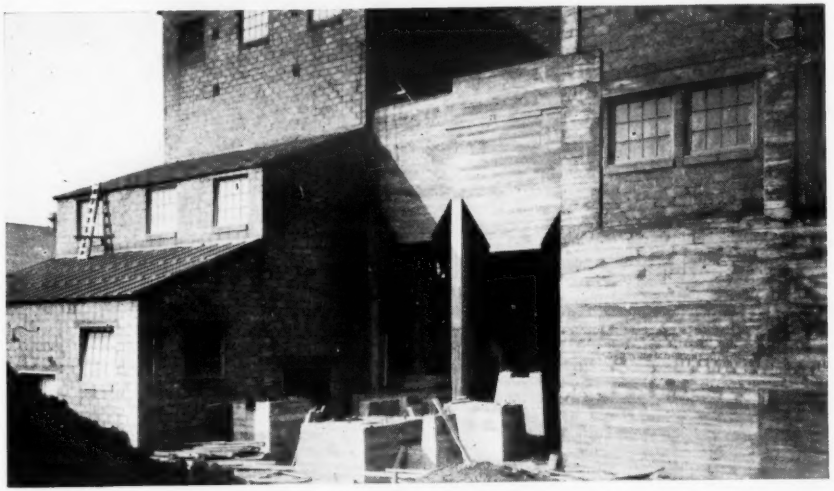


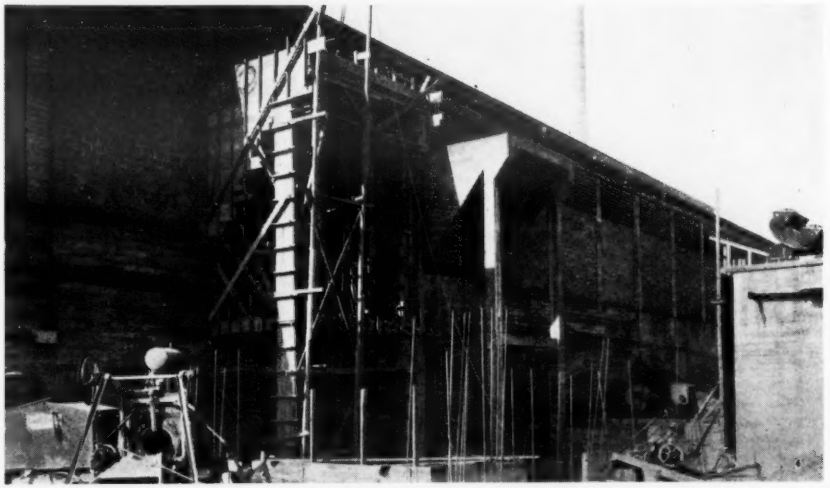
The plant and quarry of the Indiana Portland Cement Co., near Greencastle, Ind., showing the layout and general scheme of operation

New Plant an Enlargement

The new kiln was built alongside the clinker and raw-material storage, the original kiln being on the other side Thus it was a comparatively easy matter to provide feed for the clinker and the facilities to handle it without disarrang-





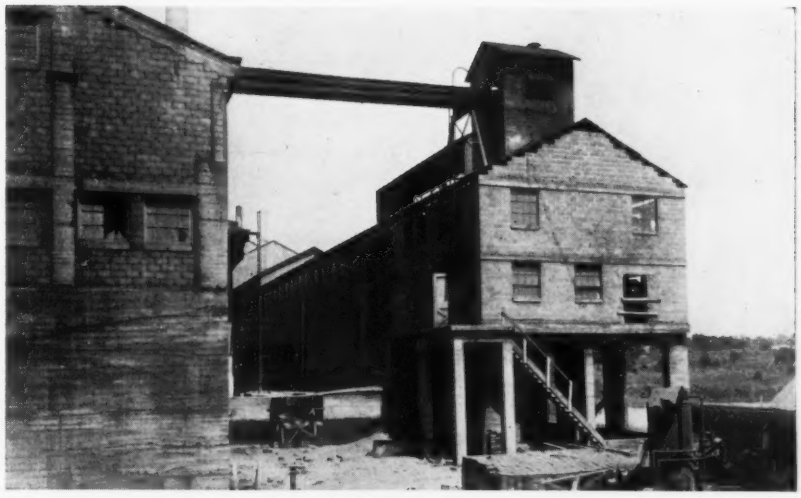


ADDED EQUIPMENT WHICH INCREASES PRODUCTION AT THE INDIANA PORTLAND CEMENT CO.

Upper right—In this battery of kiln piers a section of kiln is shown mounted on logs ready to be rolled into position on its permanent concrete pier. Upper left—This is the new kiln building, now under construction. The concrete slurry silos have been completed, but the hopper for clinker at the side of the material storage building is still in process of erection. Lower left—The new coal-grinding unit under way. Lower right—The hoppers to the raw material storage building, where the clinker is discharged by a bucket elevator

opening. This crusher reduces the stone to 2½ in. and less. The crushed stone is reclaimed by a short inclined belt conveyor and the stone deposited in storage by a bucket conveyor. The cinders go through the same process.

Beneath the respective bins containing the limestone and cinders are rocker feeders; these feeders are regulated by the chemist. The material from each bin is deposited on one inclined belt conveyor which takes the raw mix to an elevator depositing to bins over the wet kominuters. The clay is handled through a wash mill and deposited at a storage chamber equipped with a mechanical agitator. As the clay is needed it is reclaimed by bucket elevators and distributed to the preliminary grinders in such proportions as are determined by the chemist.



One end of the new kiln building showing the overhead screw conveyor for pulverized coal

The Raw Grinding Department

The raw grinding department consists of two No. 85 kominuters, two separators, one tube mill and one combination ball mill.

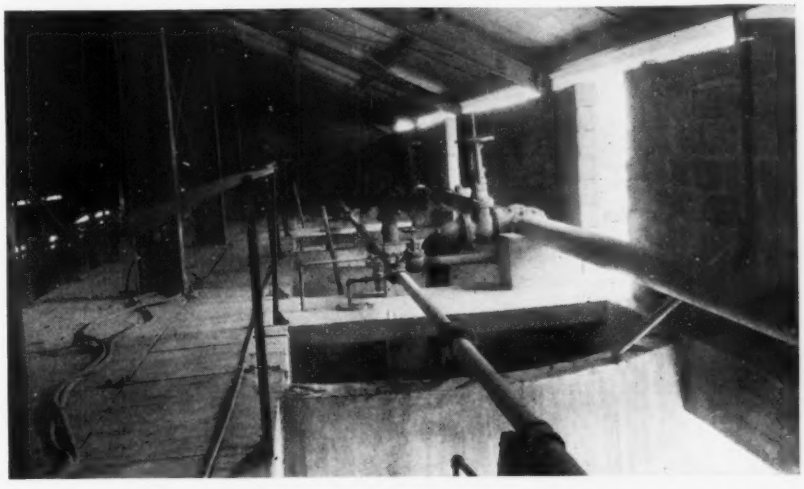
This coal-grinding unit shows the raw-material storage building, to the right, and the old coal-grinding plant to the left

In the two kominuters the material is ground wet, the kominuters discharging to bucket elevators feeding the 7x24-ft. combination ball mill. This mill grinds the raw wax in such manner that 70 per cent of it will pass through a 200 mesh; the mill also handles the capacity of the two wet kominuters with comparative ease. The combination ball mill uses 1-in. manganoid balls in the finished compartment.

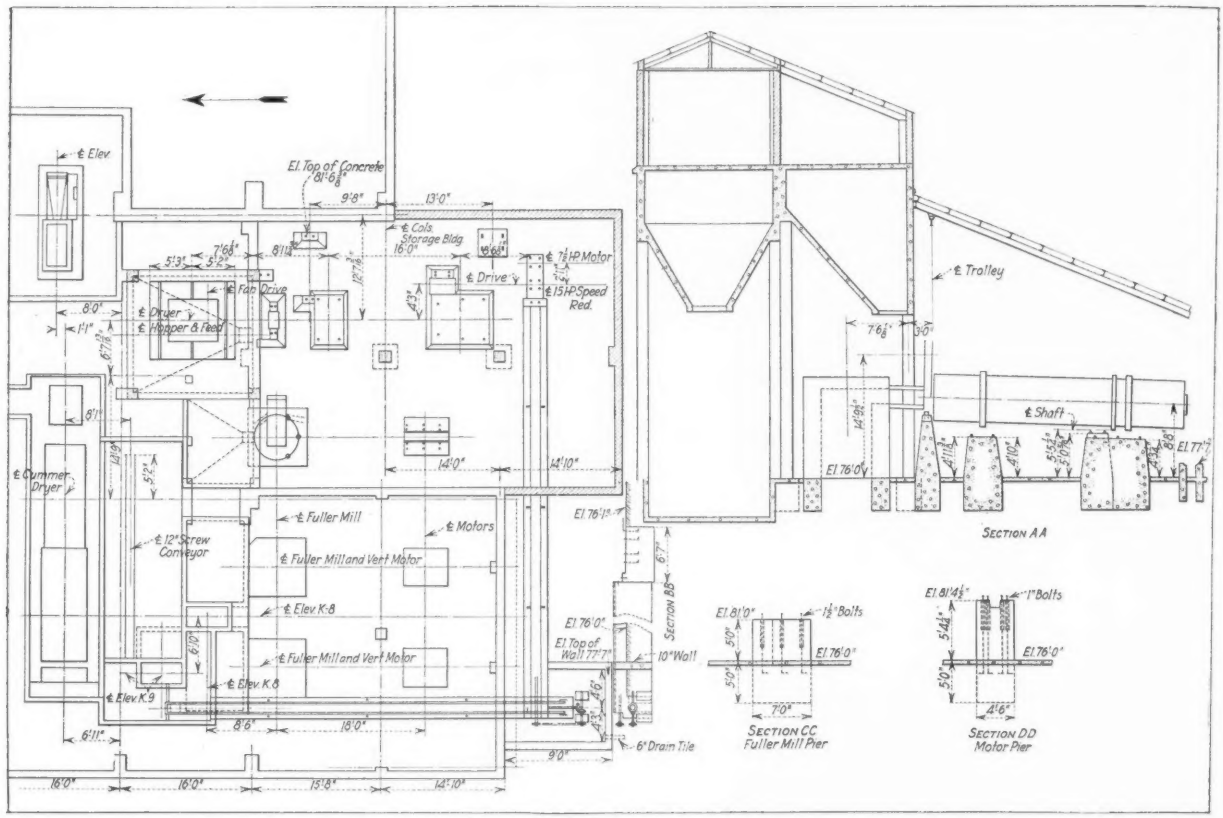
Material from the kominuters can also be discharged to the separators which feed the tube mill and for the final raw grinding. This equipment, however, is used only when a breakdown occurs at the combination ball mill. Thus it can be seen that the raw grinding department is well fortified against breakdowns or accidents.

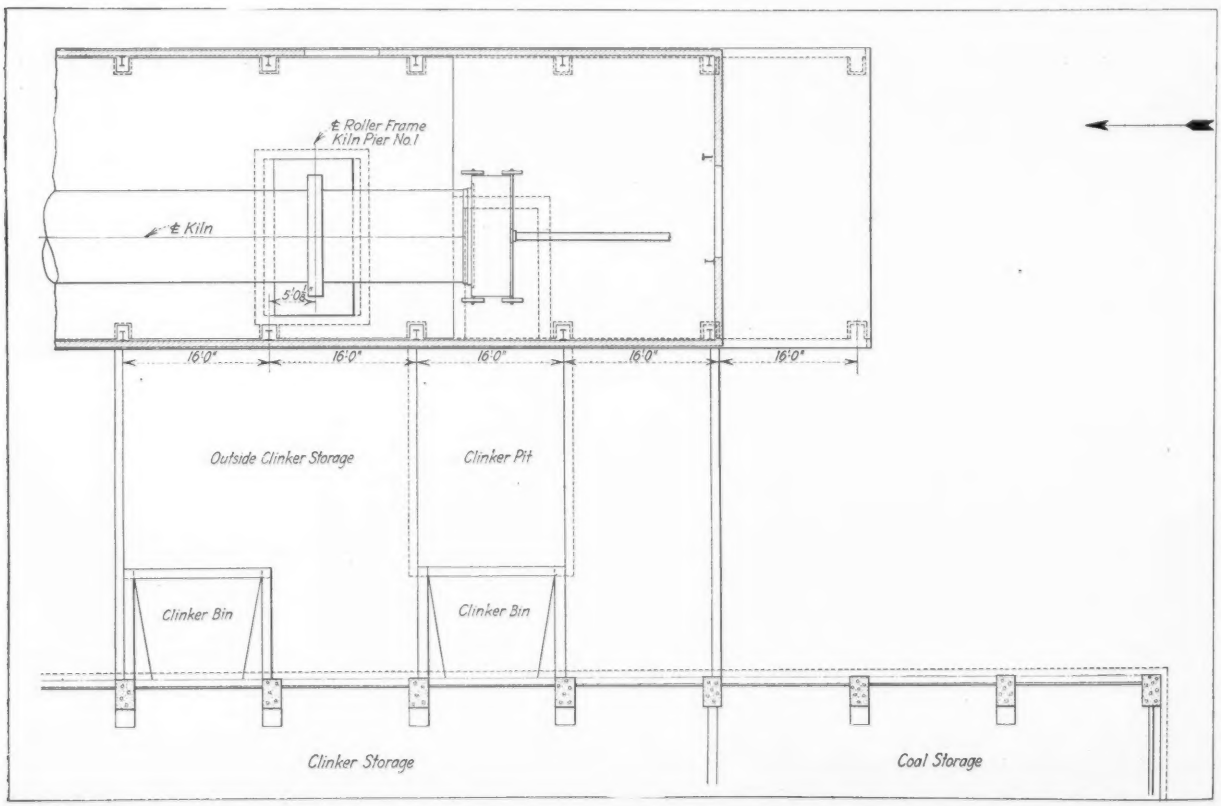
The slurry from the tube mill or combination ball mill is discharged to a bucket elevator which delivers the material to one of the correcting basins, each of which is equipped with mechanical agitators. The correcting basins have a capacity of 220 bbl. each. Here the slurry is sampled and analyzed in the chemical laboratory. After the contents of the basins have been corrected as to chemical content it is discharged to two mixing basins, both of which are also equipped with mechanical agitators. From the mixing basins the slurry is pumped to the storage basin for No. 1 kiln or to the four slurry storage silos for No. 2 kiln. The new slurry storage silos have central air-agitated systems while the original storage basin for No. 1 kiln has a gear-driven mechanical agitator. The capacity of these new silos is 90 bbl. each.

The slurry for No. 1 kiln is pumped



Top of slurry storage tanks. Here the slurry is agitated by air injected to the tanks through a pipe in the center



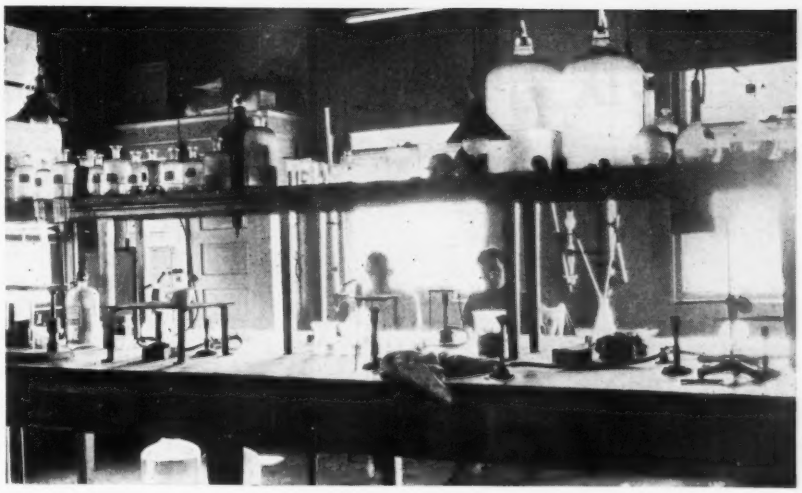


The upper illustration shows layout coal mill extension, and the lower the south end of kiln building No. 2

from the storage basin by duplex plunger pumps and is fed to the kiln through a Smidth feeding device. Slurry for No. 2 kiln is drawn from the silos into twin screw conveyors leading to twin bucket elevators which put the slurry into an auxiliary tank on top of the smoke chamber, from which it flows into the kilns. The auxiliary slurry storage has sufficient capacity for a 5-hr. run. Slurry is fed to the No. 2 kiln by gravity through a feeding device of the company's own design. The overflow from the auxiliary storage is put back into the slurry silos.

Both these 10x240-ft. kilns have chambers which collect the dust carried through the kilns by the draft. The smoke chambers are connected to two concrete stacks, each of which is 210 ft. high. Between the stacks and the smoke chamber are large chambers with dampers controlled from the burner's platform. The kiln feed is also controlled by the burner from the burning floor. Both kilns are equipped with pyrometers; these instruments show the temperature of the hot gases in the stacks as well as the gases in the chambers into which the kilns discharge. A permanent record of temperatures is kept in the laboratory by a recording pyrometer.

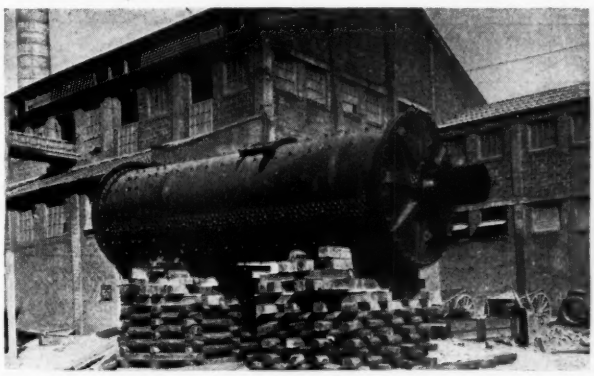
Clinker is discharged into drag conveyors. That from No. 1 is conveyed to clinker storage, while that from No. 2 is conveyed to an elevator which discharges to a hopper leading direct to the clinker storage in the building. The hopper for receiving the clinker from No. 2 kiln was the only alteration necessary to the storage building.



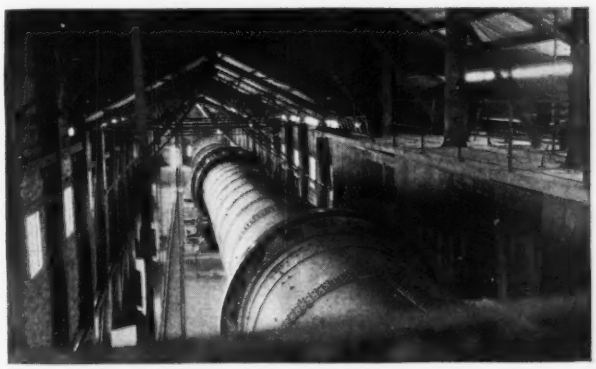
A section of the company's chemical testing laboratory

The clinker is taken from storage by the overhead crane and deposited in a hopper. Here the gypsum is added and the mixture deposited on a belt conveyor which leads to a bucket elevator discharging to bins over the finish grinding machinery.

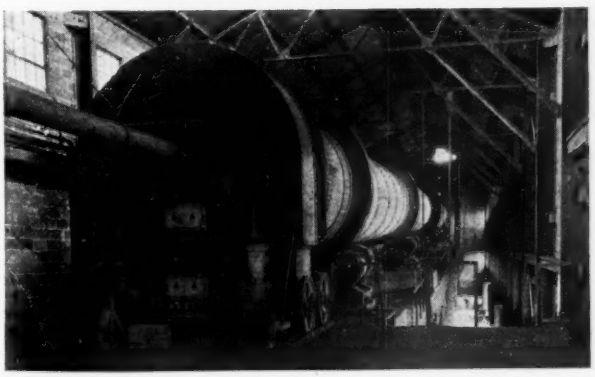
The finish grinding is done by a 7x24-ft. Worthington compartment ball mill, a No. 85 kominuter, and a No. 18 tube mill. These are two separate units. The compartment mill is the new installation; it contains 20,000 lb. of 5-in. balls in the



Combination ball mill used in both the raw and finish grinding departments

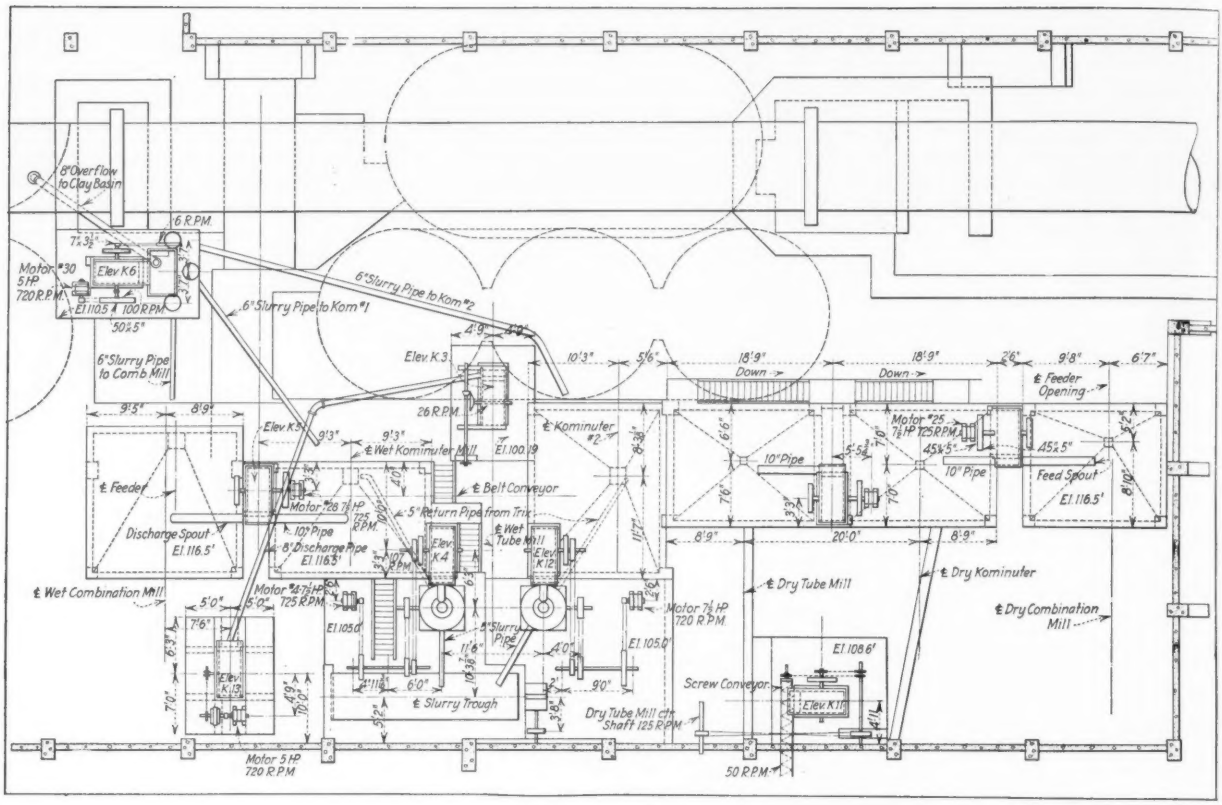


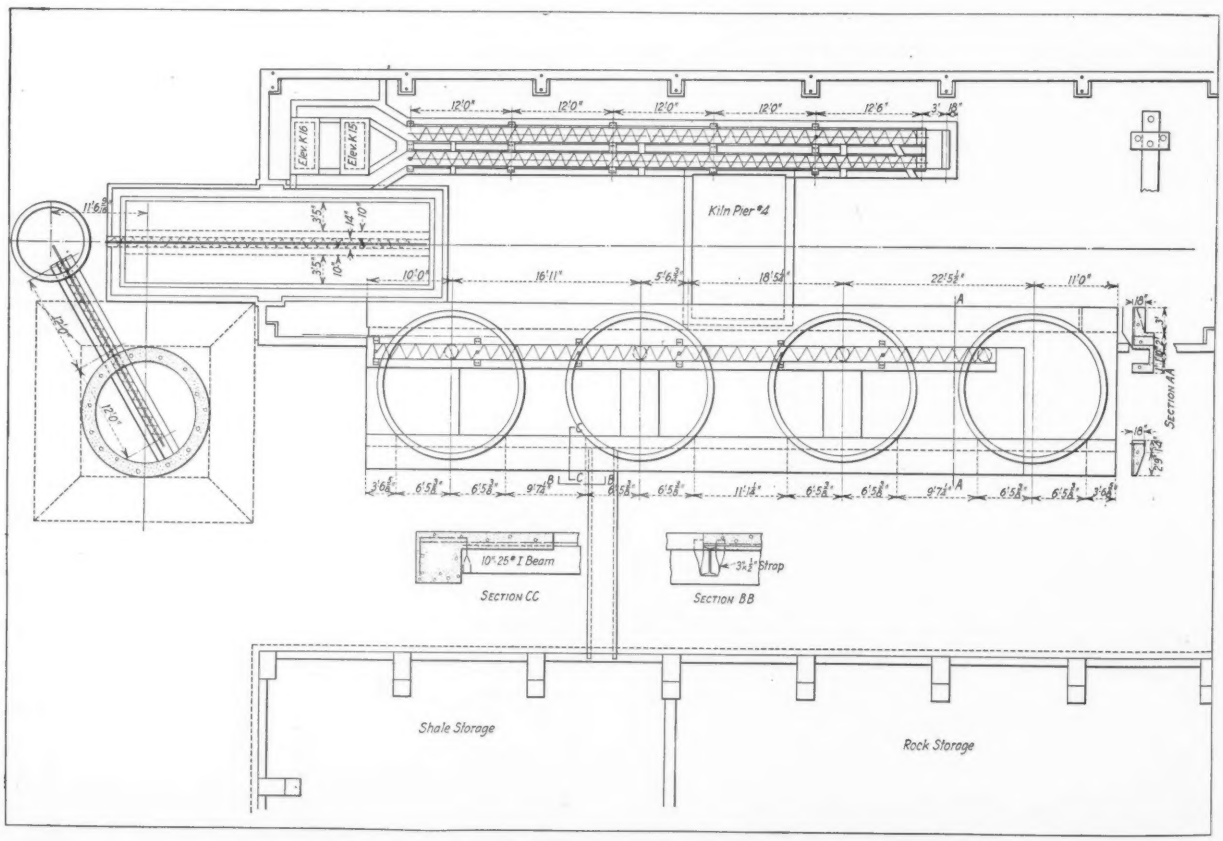
Looking down the new kiln. The slurry tanks are to the right of the kiln



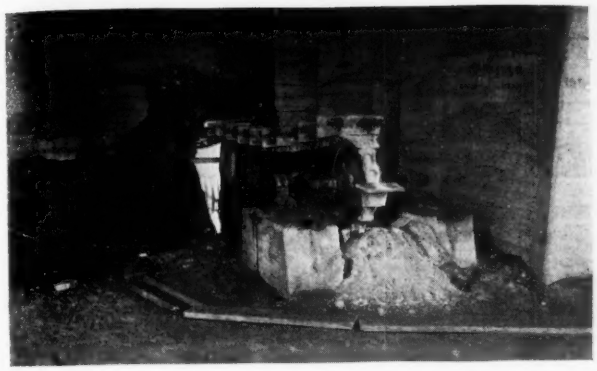
The firing hood on the new 10x240-ft. kiln and the pulverized coal injector

The raw-material storage building. Two overhead electric traveling cranes handle these materials

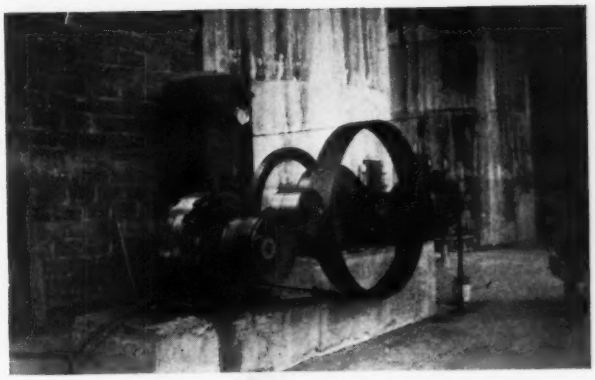




Machinery layout at top of bins above, and floor plan at top of slurry silos below



Chain drag conveyor for live clinker from No. 2 kiln



Air compressor which supplies air for the slurry agitation

preliminary end and 60,000 lb. of ⅜-in. balls in the finish end. Both the combination and the tube mill discharge to separate bucket elevators which in turn discharge to a screw conveyor delivering the finished cement to the concrete storage silos. Here the cement is elevated to the top of the bins, then screened and distributed by another screw conveyor to any one of six storage silos having a combined capacity of 60,000 bbl.

No tunnel or screw conveyor has been provided to take the cement from underneath the bins or for conveying it to the packing machines. The packers, of which there are four, are on tracks laid in reinforced concrete, and the machines on each side of the storage bins are moved from bin to bin as the occasion requires. From these bins the cement is loaded on cars.

Loading tracks extend on either side of the building so that cars can be spotted directly in front of the machines, regardless of the bin at which they are loading; this method enables the men to move the cement with minimum effort as the distance from the machines to the cars is about 15 ft. The sacked cement is trucked into the waiting cars.

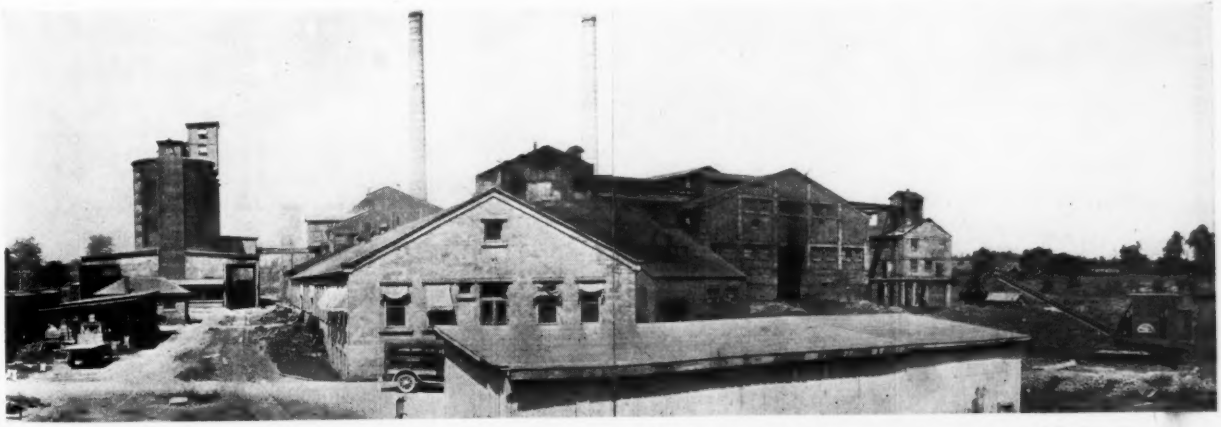
A 42-in. Fuller mill for coal pulverizing ready to be installed

Coal-Pulverizing Equipment

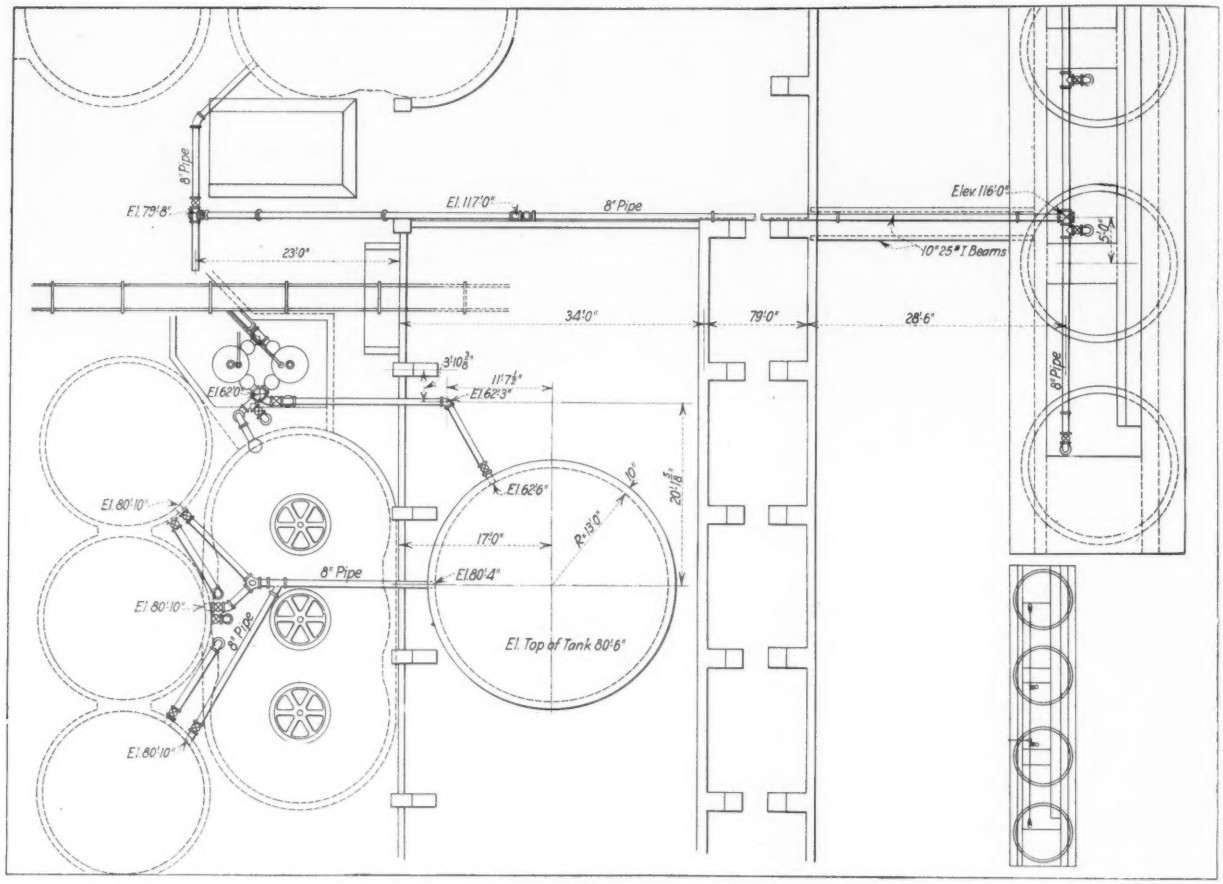
The coal is carried into the raw-material storage building, dumped over a track hopper and then distributed to storage by the overhead electric traveling crane. The coal is taken out of storage by the same crane and deposited into a hopper feeding a coal crusher which discharges directly into a chain bucket elevator. This elevator discharges the coal into a short belt conveyor equipped with a magnetic pulley. The belt conveyor discharges into one of two pit hoppers before the driers. These driers are discharged by screw conveyors into a battery of three 42-in. fan discharge mills.

The ground coal is discharged into screw conveyors and is pumped by coal pumps. These pumps deliver the pulverized coal to bins ahead of the kilns. A screw conveyor underneath the pulverized coal bin draws the coal out and it then is blown into the kiln by Garden City cycloidal fans.

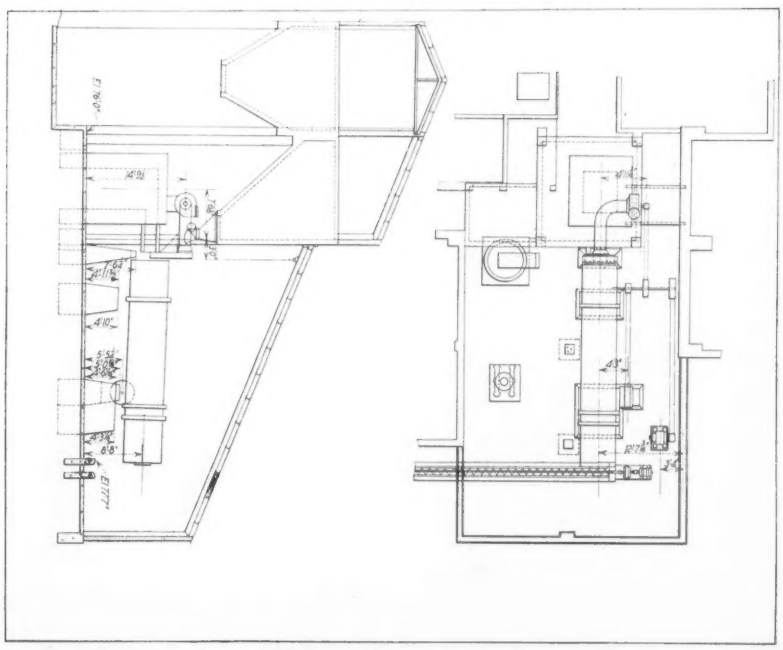
This conveyor system has four main elements: A helical pump, the function of which is to start the flow of material; a source of compressed air supply; a pipe through which the material flows; and diverting valves which allow the flow to



In this rear view of the plant, from left to right, are shown the finished cement silos and packing plant, the office, storeroom and machine shop, the coal pulverizing department, the raw-material storage building and the new kiln building



This shows the piping layout for the Dorr basin



More details of the plant

be discharged through any number of branch lines into the service bins.

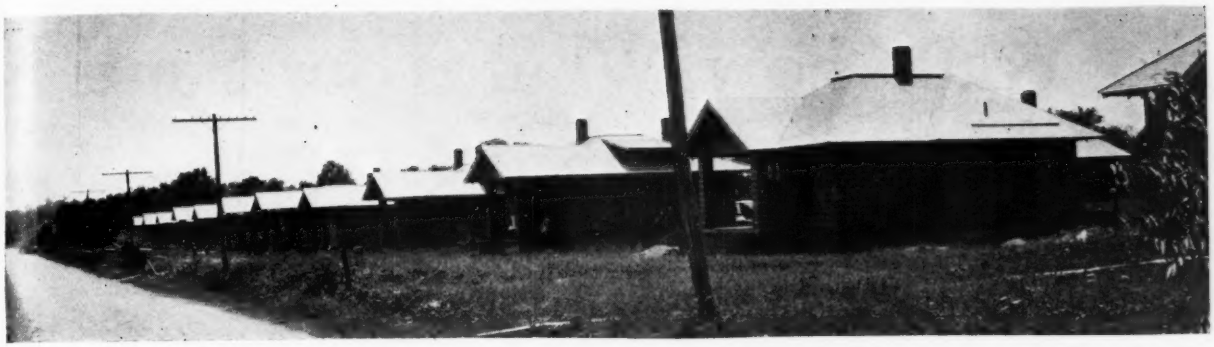
The Indiana Portland Cement Co. has track connections with the Monon and the Pennsylvania lines as well as having a switch a short distance from the plant to Terre Haute, Indianapolis and Eastern Traction Co.'s tracks.

The Power Plant

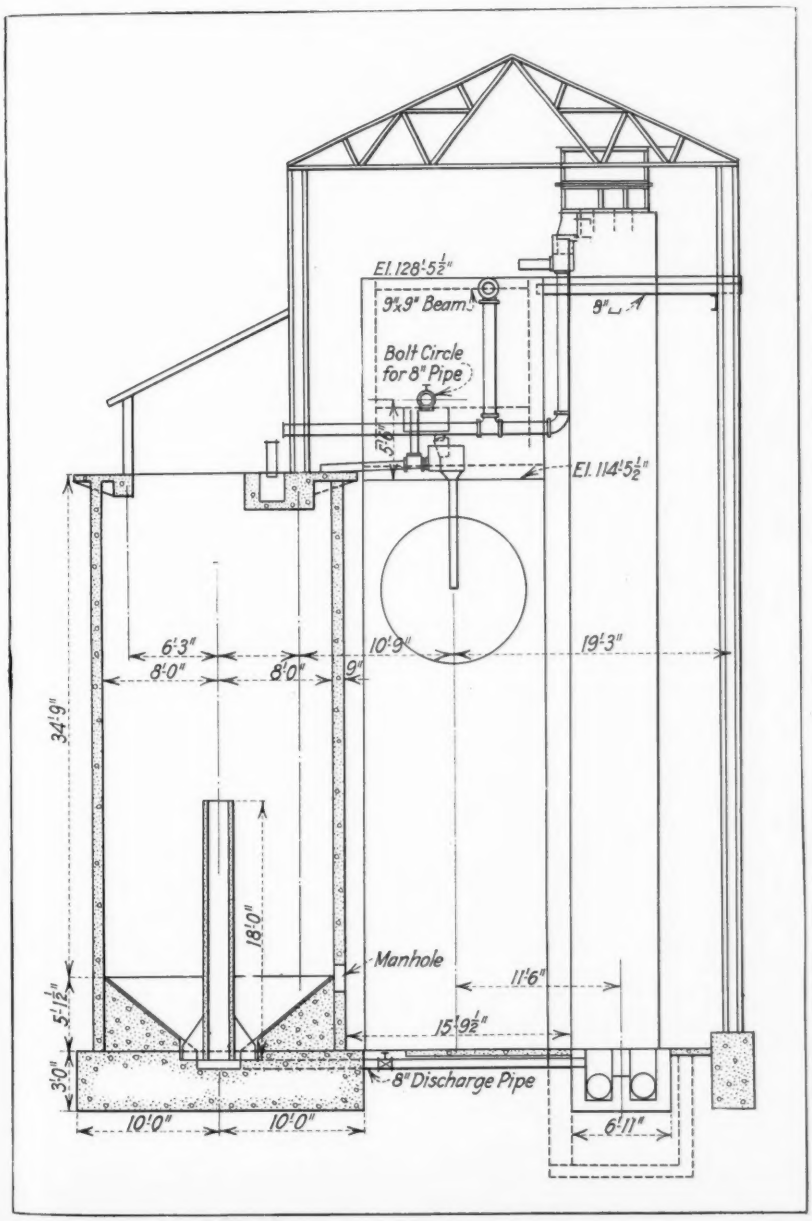
The plant is electrically operated throughout, the power being purchased from the T. H. I. and E. Co., which delivers current to the transformers at 33,000 volts. It is then stepped down to 440 volts, 25 cycles, three-phases, under which the motors operate.

In every case, all machines serving one another are connected through interlocking devices; the stopping of one machine stops all of the interlocked units and the machines can be started again only in their right order. A complete hourly record of the power requirements of all of the departments is kept with the power consumption of each department on the switchboard.

The company has 15 houses for the use of its employes on the plant site as well



The company has provided attractive houses for its employes, some of which are shown here



Section A-A through north end of kiln building No. 2

as a large boarding-house at Limedale Junction.

The original unit of the plant was designed by the F. L. Smidth Co., New York City, and was erected by the A. J. Yawger Co., Indianapolis. The second unit was designed by the company and Dodge and Heiby, engineers and contractors, Greencastle, Ind. The latter firm also erected the buildings and installed the machinery. There are approximately 10 motors in use and almost everything is direct driven with the exception of the drives, which have been installed on the final grinding units and silent chain drives on the compartment mills.

The offices of the company are maintained at the mill proper with the exception of the sales and executive offices; these offices are in Indianapolis. The president of the company is Adam L. Beck; vice-president, Peter Martin; secretary, Will H. Hart; purchasing agent and treasurer, Marshall Beck; sales manager, Otis A. Straus, and chief chemist, S. V. Onderdonk.

Polish Producers Offer Cement for Export

LARGE quantities of cement answering the German specifications, and in many instances passing the required test by a wide margin, are available for export, says the Journal of the American Polish Chamber of Commerce and Industry. Interested American importers will be placed in direct touch with cement manufacturers in Poland.

Reduced Tariff in West

A NEW tariff has just been received, publishing a rate of 94½ cents per ton, effective March 15, on sand and gravel from Waubay, S. D. to Aberdeen, S. D.

The new rate is a substantial reduction from the old basis, and was voluntarily established by the C. M. & St. P. railroad to stimulate movement from Waubay in anticipation of increased building activity and to meet the rate of the M. & St. L. from Watertown.

Do You Know What Your Sand Is Good For?

By F. G. Schultz
Ferdinand G. Schultz Co., Pittsburgh, Pa.

Here Are, Briefly, the Sand Requirements for Glass and Paint Making, for Grinding, Cleaning, Sand-Blasting, Furnace Lining, Foundry, and Other Uses

IT seems to be the consensus of opinion that the average defective casting loss in iron and steel plants ranges from 2 to 15 per cent. The excuse for this loss is now being chiefly centered on the sand, of which the foundryman, as well as the producers of foundry sands, know so little. As an illustration, we are handling for industrial purposes about 45 varieties of sands, which is produced in eight different states.

This number could probably be halved, thus saving considerable freight, time, and other expense, and limiting as far as possible the necessity of shipping sand across the continent, if the consumer would study and find means of using local sands to advantage.

In fairness to the sand industry we believe it can be safely claimed that it never was a paying business on the whole. Competition has always been keen, and we believe that if the matter were looked into it would be found that sand plants change ownership with a degree of regularity that is alarming. There are exceptions, of course.

It takes the average sand plant about four years to reach the end of its financial string, but one thing in favor of the consumer, fortunately, is that there always seems to be another group of investors ready to take over such a plant, invest new capital, and then run for the usual period, only to find they knew less about the business after four years than when they started.

This has particular reference to plants making silica sands from crushed rock. The chief difficulty in the manufactured sand business for the iron and steel trade seems to be that the consumer does not appear to know just what he wants. On the other hand, of course, the grade of rock at a given quarry may change, causing trouble in the foundry, but even in such instances there are cases of a few foundrymen possessing the intelligence and science—or was it luck?—to be able to change their mixture, thus using the local sand to economical advantage.

These cases were very conspicuous during the war, when sand was sand. Nor can it be disputed that there are numerous cases where sand plants have been started by operatives knowing nothing whatever of the general requirements of the industry, and through clever salesmanship inducing foundries to use a sand entirely unfitted for their purpose.

It often happens that a mixture of a local sand with that of a plant located more distant may make an economical mixture with satisfactory results.

But Little Confusion in Glass Industry

In the glass industry there is very little confusion as to sand requirements. The average glass plant has its chemist. In manufacturing flint glass, he is careful to eliminate the iron bearing sands, while the common bottle producer will not object to buying sand containing a limited quantity of iron. Iron will give the glass a green tint. The chemist has his specifications, and the producer of sand can readily ascertain whether his product will satisfy the glass industry. For grinding or polishing glass another grade of sand is used, the specifications of which are based upon physical tests.

In paint manufacturing, sand requirements are well defined, also. For certain grades of paint a pure silica ranging from 200 to 500 mesh is desired to give the paint a "tooth." This is a soft variety of silica, known as amorphous or decomposed, analyzing about 99.5 per cent pure. It is prepared with a water ground, water floated process, and is similar to what is classed in Government reports as Tripoli and Silex. It is used for grinding valves, wood fillers, putty, metal polishes, scouring compounds, mechanical rubbers, enamels, statuary, stucco, fine cement work, foundry facings and partings, asphalt and composition flooring, talcum powders, nail polishes, dentifrices, soap and soap powders, cleansers, and so on.

For Cleaning and Sand Blasting

For cleaning or sand blasting castings, removing furnace scale after heat treatment of forgings, cutting away wire edges on stampings, giving the metal a "mat" finish preparatory to plating or enameling, and for removing mill scale from hot rolled bars, sheets, or plates, a sand produced in the State of Illinois seems to give superior results. This particular sand is rather fine, but of unusual uniformity, and on account of its physical structure it seems to give superior results, no doubt due to its flint-like structure and its ability to stand up under the terrific impact after leaving the air hose. For this particular use there is small chance of confusion in the trade, inasmuch as trial tests are so simple and results are so readily apparent that the plant management has slight difficulty in selecting a material adaptable to its use. In this respect, however, sand as an abrasive has shown such superiority to metal abrasives that there seems to be no comparison. Cleaning castings by special sands not only leaves an aluminum-like surface in appearance but it also shows up defective castings by exposing defects which may be near the surface, whereas metal abrasives are likely to be shot into the casting, filling up defective spots, thus causing loss in the machine shop.

Requirements in Steel Making

More steel is manufactured now by the open hearth than by any other process. In the making of the acid bottom, silica sand is the material chiefly used. Several years ago an open-hearth furnace at Vandergrift, Pa., made chemical and practical tests covering sands they were using in making their acid bottoms. They experimented with two sands, one from Ohio and the other from Pennsylvania. The analysis of both sands were practically the same, with extremely slight variations. In this particular case it appears that a certain Pennsylvania sand gave better results, on account of the physical condition. Quite frequently sand is received showing a good analysis, but on account of its physical condition is not fit for use. It seems that the best results in the open hearth are obtained from a sand of a flaky nature. Sand of a soft granular nature, when ground and put through a screen is entirely too fine, and when the furnace is heated, such sand will run to the bottom, since it has a lower fusing point, and after two or three heats will flake off in large cakes.

Sand for Steel Casting

In using sand for steel casting work, it might be said that seldom will two foundrymen making the same grade of work agree on the same sands. Here is a large analysis will determine the fusion of sand, as well as the amount of bond, and nature of the bond it contains. Microscopic tests will show the shapes of the grains. But where can be found a foundryman who, after being furnished with the bonding qualities by analysis of a certain sand, is in position to positively guarantee that it is the best possible. Also, by what will the foundryman judge, after making microscopic tests, whether the gases generated by pouring the molten steel will safely escape through sand with grains rounded, angular, or flattened? What is the standard of permeability?

Experience will teach that better results are obtained from certain sands, but this experience is somewhat analogous to reports in the past, originating with some of the older steel companies, to the effect that the high quality of their steel was due solely to the efforts of Bill Jones, the melter, and Bill Jones could neither read nor write, and if they lost Bill they would have difficulty in getting such good results. It also seems to be an axiom among the sand shippers that when a foundry changes foremen, look for sand going into that plant from a new point of shipment.

It seems however that the foundries making heavy steel castings strive to obtain a sand fairly high in silica, high in fusion, with a large open grain or berry. The foundries making the smaller steel castings seem to use a sand less coarse or open. Some steel sands have a natural bond, thus reducing the addition of fire clay, molasses water, and other items of expense. There are no standards, however.

Margin of Safety

In the iron foundry, with the exception of those making heavy castings, the margin of safety in sand is an element not given much consideration. It is generally agreed that for bench work the Albany sands, which are accurately graded, have no equal, and there does not seem to be a very appreciable amount of scrap castings resulting from the improper use of sand for this grade of work.

For floor work, small casting, the coarser grades of Albany sands are still used as standard, and as the work gets heavier, coarser sands from local deposits are the rule, sometimes mixing with the Albany grade to get the consistency desired.

In making small gray iron castings, where a good high silicon pig iron—also high in phosphorus—is used, we do not believe the percentage of defective castings is as large as in the larger iron foundries making heavy castings, although in either department, except in a superficial way, no definite data is obtainable concerning fineness, green bond, permeability, physical or chemical requirements. One manufacturer making large castings occasionally finds them broken in half not many hours after casting, while cooling. The cause has never been definitely determined, possibly on account of the fact that there are no definite margins of safety on the various factors entering into general casting work. Had there been sand standards, and standards on other factors, then by the process of elimination the actual cause of defective castings could be obtained.

Brass, bronze, and aluminum requires a sand with a good bond, and very fine grained, and it is more or less conceded that the No. 00 and No. 0 grades of Albany sands give superior results. Exceedingly smooth surfaces have been obtained from such sand.

Loam is a commodity which is used quite extensively for lining runners at open-hearth furnaces, lining ladles, and for mixing in sands to give a bond. The best grade obtainable is from the Zanesville district. One deposit there contains no grit whatsoever, and is extremely plastic, making possible its use around the foundry for many purposes. In lining runners it is superior to clay, inasmuch as clay will fuse to the runners, whereas the loam can be taken up in large solid chunks when it is desired to clean the runners, thus materially reducing labor costs.

Local foundrymen's associations are beginning to recognize the importance of establishing standards for sands, and their discussions have culminated to the point where it has resulted in the American Foundrymen's Association taking cognizance of the condition. On December 9, 1921, a molding sand committee, organized under the auspices of the National Research Council and American Foundrymen's Association, held its first meeting in New York. That the results of this activity will be far-reaching cannot be disputed. But, unless considerable support is given by the local foundry associations and their individual members, it is quite possible that the good work now started may never be completed. In this case, the preliminary investigations revealing so many factors entering into the quality of sand will only tend to result in more confusion than heretofore existed.

Promoting Potash for Fertilizing Farms

TO EDUCATE the agricultural masses in the use of fertilizing materials and thus to demonstrate the distinct advantages of soil culture, the Societe Commerciale des Potasses d'Alsace, Paris, which controls the output of the Alsatian potash mines, maintains at Lyon an office and laboratory for scientific study and research, also a small farm on which the fertilizer demonstrations are shown. This little farm of 10 acres serves as a field for experiments in which are calculated with precision the right doses and the best conditions for the use of potash salts, and the results form striking collections for exhibits at agricultural shows and expositions.

Care is employed in scientific and practical methods having in view precise results—such as manner and time of application, amount of material, labor, seeding or planting, weight of crop and laboratory analyses of the results produced.

Many visitors are received at the bureau where detailed information is given concerning the rational uses of potash elements as fertilizer. Furthermore, the company will publish a book on the work and results of the 1920-1921 season.

The bureau distributes regularly collections of little sacks of potash salts, which are employed with profit by the farmers, agricultural syndicates and schools. The bureau distributes its information throughout the country, participating in expositions, visiting the agricultural associations, professors, engineers and schools, displaying photographs of experimental fields and otherwise disseminating fertilizer facts.

In its chemical laboratory are analyzed the potash salts, the soils used for experimental culture and the products harvested therefrom, and it is shown conclusively that intelligent use of fertilizer in agriculture produces not only greater quantity but better quality.

During the agricultural season of 1920-1921 the bureau organized throughout France 879 trials devoted to agricultural development by means of fertilizing.

Why not use similar methods here in the United States for the promotion of lime, limestone, gypsum and phosphate? It certainly would tend to increase the use of mineral fertilizers.

New York Meeting of National Highway Traffic Association

THE annual meeting of the National Highway Traffic Association will be held at the Automobile Club of America, 247 West Thirty-fourth street, New York City, on May 12. Reports of national committees relative to important subjects receiving attention by men interested in highway engineering, transport and traffic regulations will be heard and discussed.

Selling More to the Farmers

By Clarke A. Richards
Fargo, N. D.

Every man with something to sell—sand, lime, gravel or what-not, to farmers or any other class of customers—will find this article full of specific suggestions which can be successfully applied in his business. Because the article is written in terms of the small agricultural limestone producer, it is particularly helpful to him.

THREE years ago an issue of ROCK PRODUCTS was given to the ways and means of producing and marketing agricultural limestone. But all of the men who discussed the problems were interested in large plants.

Were the methods advocated by the owners of these high capacity mills suitable for the owners of the small plants—many of whom are producing agricultural limestone simply as a by-product? Can these men afford to prepare the expensive catalogs and direct mail literature in use by their bigger brothers? Can they afford to organize a sales force of local agents? In short, if these means are too expensive for their limited production, what are the methods by which their agricultural limestone may be made popular with the farmer and sold at a profit?

First, Know Your Territory

In the first place, the owner of a mill should study his territory. He should ascertain what product is desired in the 10 or 12 counties in which he can beat all competitors in low freight rates and quick delivery service. To do this, the county agricultural agents are good men with whom to get in touch. Right now, before business in the quarry gets to full capacity, it will pay the owner to swing around the counties and to personally meet these men. If that is impossible, a letter will do the work.

Determining Local Soil Conditions

How many producers or agricultural limestone have secured an intimate knowledge of the types of soils in the counties in their prospective trade area? The counties should be visited if possible, but a trip to the experiment station will be found to be of great benefit to the man who desires to know the where and why of limestone as related to his particular territory.

For instance, some of the land may be sandy; some may be of a heavy sour clay. Certainly the farmer who owners the sand is not interested in the fact that applications of limestone will liberate generous supplies of potash that are locked in the sour clay soils. You must know your territory in order to know your method of approach. Get acquainted—personally if possible—with your experiment station men, your county agents, the local bankers, local newspaper men, and the officers of the local farmer organizations.

Getting Acquainted with County Agents

Another thing that should be learned before any effort or money is expended is just how each individual county agricultural agent feels toward the limestone problem. It is a surprising but true fact that in this day and age there really are some of these highly trained technical men who are under the impression that the limestone problem is not important enough to warrant their special attention. Ascertain if the agent knows the game—if he is a real live booster—if he is enthusiastic. Maybe he is devoting too much of his time to organization work so that he is neglecting this important phase of his educational duties. Do not fail to call on such a man personally and talk the matter over with him. You will find him an active, broad-minded young man with whom it is not difficult to reason. A county agent can be your best friend; cultivate his acquaintance; he is worth the effort.

Cultivating Satisfied Users

The next step is to find out just which farmers have used your limestone in former years. The county agent can usually tell you just how the cars were split. The farmers to whom you billed the cars can also give you this information if you can get them to answer your letters. Get in touch with the users; they will usually give enthusiastic reports of their satisfactory results. But in case they report unsatisfactory results, by all means investigate the reasons. Limestone should give good results; if it has not, somebody has made a mistake. You can ill afford to allow some individual's ignorance or carelessness to jeopardize the popularity of your product in an entire community. You will find the county agent ready and eager to help put the quietus on any such conditions.

Have Your Product Tested

You then have definite data on hand with which to proceed. Before you start to prove to the agents and the farmers that they are in your logical trade territory and that you can give them the best service in delivery and freight charges, be prepared to prove that your product is absolutely o.k. chemically. Do not rely on private tests. Even though you know by hundreds of tests the exact analysis of your product, have it reanalyzed at your state experimental station. A report from a state institution will carry a prestige with farmers that is impossible to obtain with private tests. Not only is it essential that the experiment station gives you a report on your product chemically, but you should also be able to present to your prospects a report regarding the screen tests—the percentages through 10-mesh, 50-mesh, and 100-mesh screens. It is surprising how well versed farmers are on this subject.

Many of the smaller mills have been neglecting these important points. I have been offered limestone by four different plant owners in a single season, all of them within convenient shipping distance, none of whom could answer the above questions. Nothing will cause a farmer or farm advisor to lose confidence in the product more quickly.

Locating Prospects

This article is addressed particularly to the small mill owners and to those who are producing agricultural stone as a by-product—whose annual output is not enough to justify a large expenditure of advertising funds. If such is the case, what is the most economical way to locate prospects?

County agricultural agents, the local bankers, business men, and local news-

paper men are usually glad to co-operate. A small ad in a county seat weekly newspaper costs but little and the co-operation which the publisher will extend—when handled with gloves—is worth many times the cost.

Sell yourself to the agent on your ability to give good service because of your location—chemical and mechanical tests being equal to competitors. Co-operate with the agent. If he is planning an intensive limestone campaign, help him prepare an outline and program of work. Give him the benefit of your experience in the game; talk to him about the successful methods other agents have discussed with you. He will appreciate the encouragement and the knowledge that you are back of him.

If you are located in a limestone country where limestone can be supplied more cheaply per acre than hydrate, suggest that he arrange for debates on the subject of the desirability of one form over the other, such as "Resolved, that limestone is preferable to hydrate as a form in which to apply to our sour soils." After hearing this subject debated pro and con at many meetings—and you will always find enthusiasts for both forms—I know that the affirmative will win. And the subject will naturally be turned to a discussion of the most convenient place from which the limestone can be obtained.

Sales Letters That Get Business

If you have already written good, hearty, wholesome sales letters to a number of these farmers—the kind of a letter that talks to and not at them; the kind that shows you are ready and anxious to meet them half way; that you want to render a real service; that you are a neighbor and have the interest of the community at heart—the kind of a sales letter that has been couched in plain language devoid of big words, in which you have shown an intimate knowledge of their problems and conditions and a sincere desire to help them—then you need have no fear but what your name and product will be frequently mentioned and that

When you have a thing to sell, let your prospective customers know what that product is good for. Folders and booklets are often effective carriers of your message, and when attractively illustrated they are important factors in bringing in the business. Photographs like these are excellent sales arguments for fertilizers, and illustrations and text matter for booklets may often be borrowed or copied from state or industrial organizations when they are not easily obtainable otherwise.

Indiana Agricultural Experiment Station

The difference between lime and no lime.

An attractive presentation of the effect of lime. International Harvester Corporation

when the order for two or three cars is made up at the business session later in the evening, you will receive it.

Too many of the replies that producers of agricultural limestone send to farmers who have inquired about the product consist merely of a statement regarding the analysis and the delivered price. These are usually printed forms with the prices filled in with pencil or ink. It appears that the producer or dealer is too cocksure that the prospect is entirely sold on the desirability of limestone, that all of his interest is centered in the price. This splendid opportunity of getting in some real sales talk is overlooked, and this is certainly an opportunity that is not neglected by the manufacturer of hydrate, with the result that many farmers in limestone sections are using hydrate at a distinct loss.

No class of people appreciate a well-written letter more than farmers; nothing pays like the heartiness of a direct letter. Farmers are quick to spot a poorly executed and unmatched form letter, and resent it. Too much of the material now being sent the farmer impresses him with the idea that there is no interest in him except getting his name on the dotted line.

Many of the folders and inserts are beautiful and well prepared, in fact too expensive, more than their advertising value warrants. But few, very few of them, show a sincere desire to render the farmer a real service. The farmer of today is quick to recognize and appreciate service. Emphasize your service; there are many inexpensive forms, some of which will be discussed.

Your Prospective Customers

Remember the farmer you are dealing with today is the organized farmer. So why not take advantage of that fact? If you can get a good, clear sales message to one man in a letter that is well enough written so that he will carry it with a supply of your folders to the next meeting of his unit and read it to the members, you are securing the benefit of the cheapest and best form of advertising known, namely, word of mouth. At any rate, it is worth while to suggest such an action in your letters, especially those that go to officers of local units.

The county agent will probably be glad to furnish you with the names and addresses of the officers and buying agents of each unit of his farm bureau and other farm organizations. You will be pleasantly surprised at the results that such discussions will secure. There are always a few in each community who want a small amount of limestone. Their combined orders will make a car.

But by all means, do not make the mistake of asking county agricultural agents to act as your commercial or research agents. These men are ready to co-operate with you as they realize that you have a product which they can help you distribute and still be doing their communities a distinct educational service, and yet not act as commercial agents. Do not ask them to act contrary to their regulations.

Effective Advertising Methods

A well-written insert or circular is of great value. Farmers will read them. Farmers, however, are rapidly becoming tired of the technical type of long-winded literature on agricultural limestone with which they have been deluged by experiment stations and larger producers of agricultural stone. Data which you can obtain from your satisfied users, their stories told in pictures, will get the best results. The story of what one car produced for the several farmers who ordered co-operatively always seems real to the farmer who is reading it.

Filled with valuable ideas on selling is this article by a former county agricultural agent who is now in the advertising business. Large producers and small, and especially the small, will find specific help here along many lines, including the following:

Knowing your territory
Getting familiar with local conditions
Cultivating the co-operation of satisfied users
Locating prospects
Better sales letters
Working through buyers' organizations
How to advertise
Cultivating confidence and friendship

If you do not care to go to the expense of preparing such a booklet, get in touch with the International Harvester Co. and secure permission to use a portion of its publication, "Folks and Fields Need Lime." The company will permit reprints and will furnish cuts of the illustrations. Spring is advancing so quickly that but little time can be taken in the preparation of such matter.

Again—Know Your Territory

Know your territory. Farmers want concrete evidence. They want it from near home. What is the size and fineness of the material which has proved most satisfactory in practical use? You should find out if a railroad agricultural agent has been working with the local farmers regarding storage bins, and if so, by all means cultivate his acquaintance. His co-operation will be invaluable in helping you secure a market during the dull season.

An intimate knowledge of your territory will enable you to secure photos and other evidence of satisfaction, to be used in your advertising material. Many successful producers have co-operated in the establishment of limestone clubs and have helped develop the spirit, "This community cannot prosper without limestone."

Publicity for Your Plant

Testing Soil Samples—Many of the larger agricultural limestone companies have gone to the extent of volunteering to test samples of soil and to tell the quantities of limestone required. This is an excellent practice where the integrity of the firm is well established.

Farmers have the utmost faith in the tests of their experiment stations. It appears that here is an opportunity of which I have not seen any of the smaller concerns taking advantage. If you cannot afford to maintain your own testing laboratory, why not instruct the farmer in the proper methods of taking soil samples and furnish the bag in which he sends in his sample? This will make it as convenient as possible for him to get his sample to the state institution, which he often trusts more than a private laboratory.

You can have your advertisement printed on the bag. It can also contain instructions in taking the sample. In this manner you are showing the farmer a real personal interest, you are receiving good advertising, and you are receiving the good-will of both the farmer and the experiment station, for you are providing a safe and handy way to get the sample to its destination intact and identified.

Local Newspaper Advertising—A second cheap and effective form of advertising is in the local newspapers. Their research and service departments will be glad to furnish you the names of prospects if they know a schedule of advertising is headed their way. Moreover, they welcome stories about the unusual success of any of their farmer citizens. In this manner you can prepare some excellent publicity matter. If you make a personal tour of your territory include in it a trip to each newspaper office. They will usually be glad to mention in their news items that you were a visitor at the office and to give your concern a write-up.

Open House at the Plant—A third method is to have an open-house day at your plant. Invite all of the county agents, farmers, and one or two good speakers either from the state farm bureau or the experiment station and have an all-around good time and educational meeting. Have a chemist demonstrate a test of the stone, show by another demonstration the ability of the product to improve the mechanical condition of the soil, and conduct an inspection of the plant and your facilities for prompt service. Probably you will

not have a large crowd from outside your home county, but the hearty invitation will be remembered by both those who come and those who do not.

Litmus Paper—A fourth method is the good old standby, litmus paper. Be free in sending out samples of these convenient test papers.

Prizes—A fifth method is to suggest to commercial clubs, fair secretaries, and similar organization representatives the awarding of a car lot of limestone in parcels of two or three tons as premiums, you to furnish it at a special price. This is a good form of publicity and advertising.

Banks—A sixth method is to get the local banker enthusiastically talking limestone to the farmers. He is the man of the community who carries the prestige. Whenever you write to a banker and ask him for the names of prospects, get in some good sales talk, too. In fact, when any kind of a letter is written to anyone, do not forget to insert some good sales arguments.

As long as the custom is to sell for cash, you will want to be sure he is completely sold. He can be sold strong enough so that he will not only be willing to loan money to farmers to buy limestone, but to insist on it where it is most needed.

Business Exists—Go and Get It

It has seemed peculiar that during the last year so many of the smaller plants have closed up their doors without making any effort to stimulate business. There is a need for the product and a demand if a man will but seek it out. The manufacturer of agricultural stone is manufacturing a product that will sweeten the soil, will liberate the potash in sour clays, and will improve the mechanical condition of heavy clays a thousand per cent. He is producing a blessing and boon to mankind, but he cannot expect the rest of us enthusiasts to go on advertising his business indefinitely; it is time that he stepped out and started in the game himself.

The owners of the small mills are safe in magnifying the following advantages: Low freight rates, quick service, excellent quality, knowledge of local conditions, willingness to co-operate.

Inspect Buffington Plant

Railway Engineers Entertained at the Universal Portland Cement Co.'s Great Plant—Went Through No. 3 Unit

By LIMAN SANDROCK

Oh, Paddy, dear, an' did ye hear
How we wint on Patrick's Day
For to call an' dhrink a cup o' tay
Wid Mister Affleck, dear?

YES, 'twas a grand green day for the windup of the American Railway Engineering Association's convention in Chicago, March 14 to 16. For President B. F. Affleck of the Universal Portland Cement Co. had arranged an inspection trip to the company's Buffington (Ind.) cement plant, said to be the largest in the word.

A special train took the visitors and guests, including the Rock Products editors, out of the La Salle station at 10 o'clock in the morning. The fun began when cigars and cigarettes were passed around and a shamrock pinned to each man's coat.

Arriving at the plant, they were fitted out with a cap and duster—a proper precaution, but a sad blow to their dignity, for even their own mothers would not have recognized them. Groups of eight were soon formed in line at short intervals, under guidance of a company official, and the inspection began.

What was seen was truly marvelous, but to describe a cement plant to readers of Rock Products is "carrying coals to Newcastle." Suffice it to say, all were deeply impressed by the developments in cement manufacture and the perfection of operation attained.

On returning to the offices the guests were met by attendants who received the "mine" clothes and scrubbed and brushed each one into recognizable shape. Considerable fun was gotten out of this performance as some of the friends made during the inspection could not be identified in their ordinary attire.

Soon the invitation came to proceed to the company's cafeteria and have lunch. Just a brief thought as to this cafeteria: It's a wonder! Situated in easy access of all the departments of the plant, it is patronized by all of the employes, whether she is a lady of the bag storage house, he a gent from the embankment, or the big boss of the whole works—truly a democratic arrangement. The cafeteria occupies a building by itself and is light, sanitary and delightful in every particular.

An orchestra of some eight or ten men recruited from the plant and headed by the chief chemist, discoursed at intervals snappy jazzes, marches, a potpourri of popular songs—and the "Wearing of the Green" as an encore—interspersed with a rendition of "Lucia di Lammermoor" that couldn't be done better by professional musicians. And they play without any remuneration—just a tribute of loyalty and regard to the company.

One of the big thoughts that came to the visitors was the very evident desire of the officials to make the employes' work as pleasurable, interesting and provocative of the best that is in them as possible. There are some fine long-service records among the men at the Buffington plant. One guide, Mr. Jayme, the storekeeper, has been with the company for more than 12 years, and he was a delightful, instructive host to his little squad.

Around 2 o'clock, having received a cordial invitation from President Affleck and his associates to come again, the party was photographed in front of the waiting train and then returned to Chicago.

World's Graphite Production Lowest Since 1902

THE world's production of graphite in 1921 reached a lower figure than at any time since 1902, as shown by present statistics, according to Arthur H. Redfield, of the U. S. Geological Survey. The world-wide depression which characterized 1920 was continued in 1921. The stagnation of graphite mining in the United States is both a part and a result of world-wide conditions, the natural consequence of the overproduction in 1917, stimulated by the abnormal demand for graphite crucibles during the World War.

Madagascar was the weak link in the chain in 1921. The overproduction in 1917 left surplus stocks that were estimated at 32,500 metric tons on April 1, 1920. The exports during the remainder of the year reduced this amount to about 20,300 tons.

This depression was shared by the graphite industry of Canada, which is owned by American capital and ships its product to the United States. Shipments of amorphous graphite from Mexico shared this depression to a less extent.

Graphite production for industrial use in all countries except Germany suffered from the depression due to the overstocked condtion of the Madagascar market. The depreciation of the mark protected the Bavarian product from destructive competition with Ceylon graphite. Madagascar graphite, though cheaper, could not displace the Bavarian graphite because of the difficulty in separating the mica content of the Madagascar product. Graphite was imported into Germany chiefly from Austria and Czechoslovakia, and production there in 1921 depended almost entirely on the German demand. Little definite information is available as to the production of graphite in Chosen and in Japan. Data gathered from foreign trade statistics indicate, however, that the production in both countries was reduced in 1921.

Making Concrete Products

By J. W. Lowell
Assistant Manager, Service Bureau, Universal Portland Cement Co.

What the Concrete Products Industry Needs Most Is Scientific Research—Here Are the Results of Some Research Work in This Industry as Presented to the American Concrete Institute Recently by the Committee of Which Mr. Lowell Is a Member—Marketing Problems As Well As Technical Production Problems Have Been Carefully Treated Here

FROM year to year the activities of the American Concrete Institute come more and more in contact with a concrete industry that has been struggling along practically unaided by scientific research. Every step of its progress has been contested by strongly combined competitors. Regardless of all of this opposition, the concrete products industry has interested thousands of investors who have put more than fifty millions of dollars into factories making various kinds of products.

Ordinarily, concrete products are considered as concrete block, drain tile, and pipe, but these are only a few of the hundreds of products now being manufactured. The possibilities are unlimited, as is readily shown by the fact that several concrete products manufacturers are now specializing on furnishing traceries for church windows.

While it is true that all kinds of concrete products are being manufactured, a close investigation of the concrete products industry would show that the advancement in concrete products manufacture has been very slow. What is needed most is scientific research and the application of engineering principles combined with more enlightened management and sales methods.

The first problem in the design of the products plant is the general layout. Though local conditions, such as availability of aggregate, trackage, and output will affect the design materially, certain features of plant layout should ordinarily be incorporated depending upon the output. Mechanical handling of the aggregates and cement into elevated bins so that gravity can be used in plant operation is desirable.

A study of plant layouts has resulted in the preparation of seven plans, which are shown in the accompanying illustrations. These plans show not only the detailed layout, but also a daily operation chart.

In studying the design of curing rooms for concrete products plants, it is evident there is not so much trouble in arriving at a conclusion as to the best design because the problem is to give moisture and heat to the product at the least cost in order that the hardening of the product can be hastened.

The Best Method of Curing

Several methods have been suggested at various times for steam curing rooms, such as the use of steam shot into troughs of water, radiator systems and water sprinkling, and low pressure steam shot directly into the curing rooms. A scientific analysis from the standpoint of effectiveness and economy shows that steam radiation through pipes with an extra pipe equipped with controlled openings to regulate the amount of saturation in the curing room will prove most satisfactory.

Before designing the heating system, climatic conditions should be studied to arrive at the temperatures to be used. Obviously, a heating plant designed to meet the extreme conditions of time and temperature would be entirely too large for normal conditions. In a temperate climate, there may be several days of winter with a temperature down to zero, or even below. The temperature of most of the winter days would be at least as low as 32 deg. F. It must also be kept in mind that winter conditions prevail not longer than three months, or 25 per cent of the time. Mild and warm weather covers the remainder of the 75 per cent. In warm weather the factory output should be at a maximum, and therefore the curing time should be at the minimum. It is during this time that the finished product may be required to be ready for outside storage in 24 hours.

From the best information available, the maximum rate of absorption of heat by wet concrete in still air is approximately 1½ B.t.u. per sq. ft. of exposed surface per deg. difference in temperature per hour. Therefore, knowing the number of products in a chamber, their exposed area and the number of pounds of concrete the total B.t.u. required to raise the product to a given temperature and the number of hours required to absorb that heat can be determined.

Designing the Plant

Another factor in the problem is the quantity of heat generated in the hardening of concrete. Although some experiments have been conducted indicating that considerable heat is given off through chemical action, results are not such as to make it possible to state definitely how many B.t.u. should be figured under ordinary operating conditions.

It is evident, however, that this quantity of heat will help materially. As there are, however, so many unknown factors in the problem, this extra amount will only be considered as being useful when the temperatures are outside the range for which the heating system is designed.

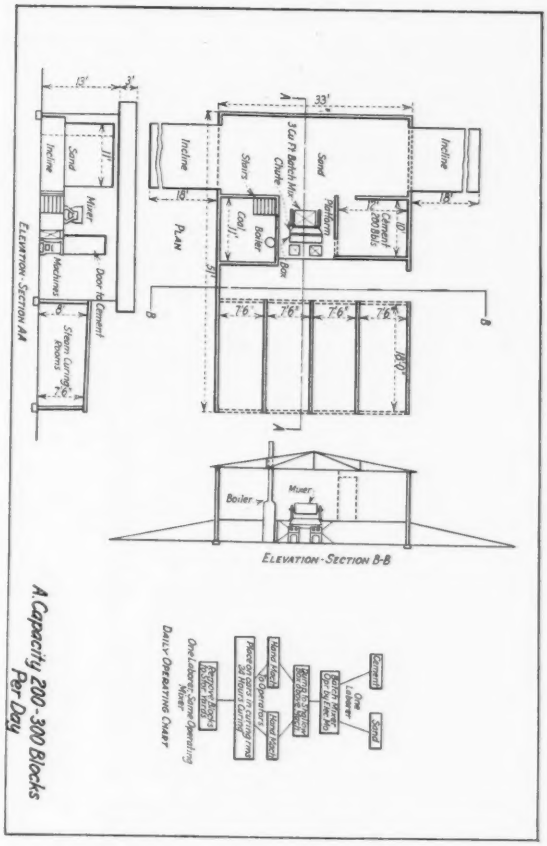
The following assumptions are made in designing the plant:

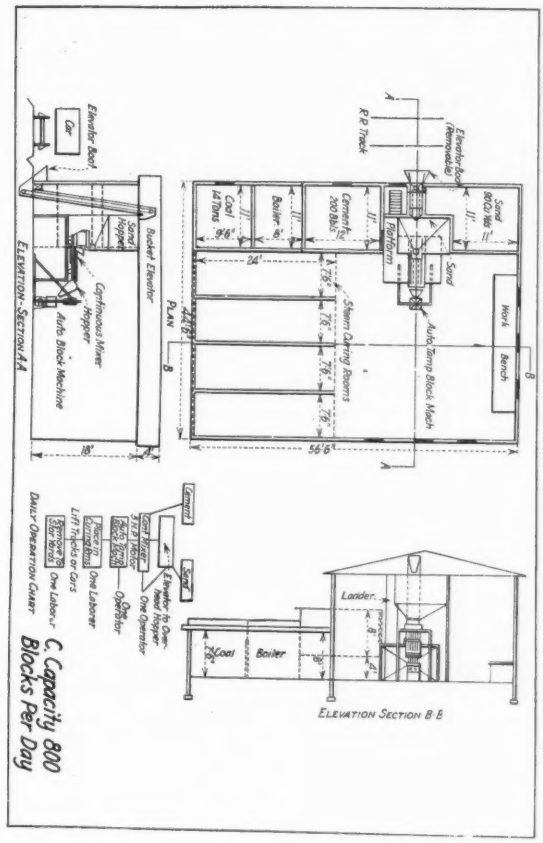
1. Production, 1000 8x8x16-in. blocks per day.
2. Each curing room will hold one-half day's production.
3. Each room will be wide enough to conveniently turn and manipulate a lift truck or to place three rows of products racks or cars. A 12 ft. width is adopted.
4. Each room will be 35 ft. long and 12 ft. wide.
5. The height of the roof will be a minimum in which a man can work without injury to himself. Adopt wall height of 6 ft.
6. Ridge of roof at center and parallel to side walls. Slope of roof a minimum to prevent dripping. Adopt a slope 1 ft. vertical to 3 ft. horizontal.
7. Construction shall be:

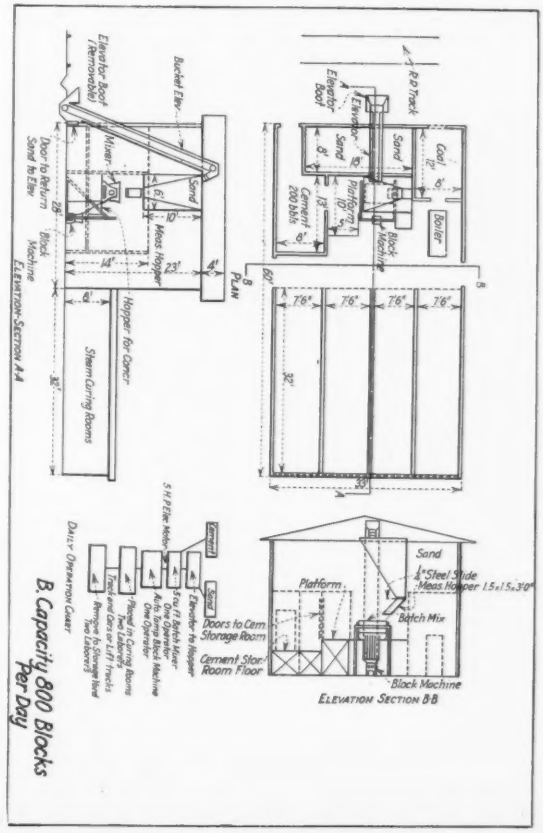
1. Concrete block or other masonry wall 8 in. thick.
2. Substantial insulated roof.
3. Concrete floor 5 in. thick on 6 in. of compacted cinder fill.
4. Doors to fit tight and be made of double sheathing with insulating material between.

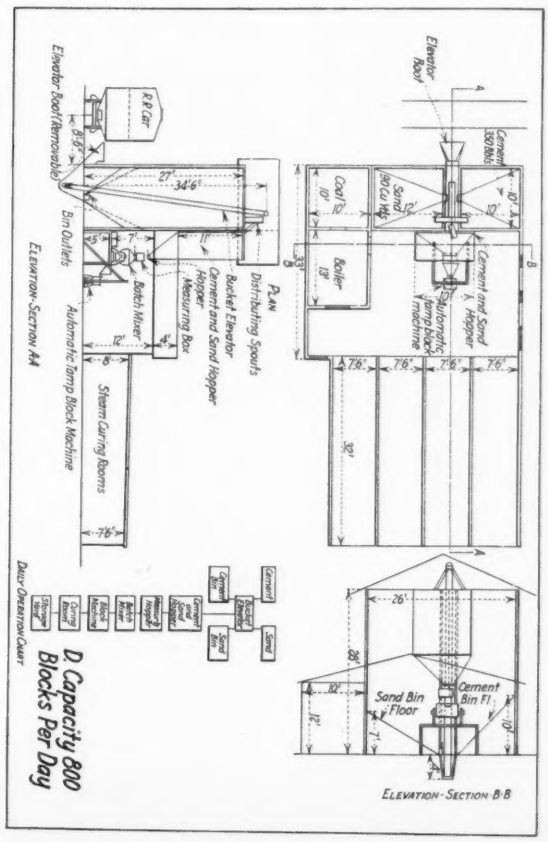
FOUR PLANTS FOR MAKING BLOCKS

Plant A is a small capacity plant. The other three for making 800 blocks a day differ in methods of operation. In plants B and C the cement is handled in sacks and the aggregates in bins, while D is for bulk cement. B and D use batch mixers, while C has a continuous mixer









Assumed Operating Conditions

1. Relative humidity of air inside of curing rooms shall be not less than 80 per cent and as near 100 per cent as it is possible to obtain.

2. Curing room and product in it shall be brought to 125 deg. F. and maintained at that temperature.

3. In three of the curing rooms the temperature of 125 deg. F. should be maintained simultaneously while the fourth room is being brought to 125 deg. F. and the fifth is being emptied and filled with products. This permits 48-hr. curing, which is desirable when the outside air is above 32 deg. F., but still cool.

4. Assume the air outside to be 32 deg. F.

5. Assume the air in the plant building to be 70 deg. F.

6. Assume the temperature of the block before curing to be 65 deg. F.

7. Assume the conductivity of the curing room structure in B.t.u. transferred for each degree F. difference in temperature per hr. per sq. ft. to be as follows: Walls, 0.30; roof, 0.45; ends, 0.60; floor, 0.10.

8. Assume that the product under above conditions will be brought to the temperature of 125 deg. F. in six hours.

Finding Out How Much Heat

The solution of heating problem is as follows:

1. Maximum range of temperature from 32 deg. to 125 deg. = 93 deg. F.

The heat losses, in B.t.u., are:

		B.t.u. per hr.
In walls	$0.30\times2\times35\times6.0\times93=$	11,718
In roof	$0.45\times5\times12.6\times35\times93=$	92,278
In outside ends	$0.60\times60\times6.7\times93=$	22,431
In inside ends	$0.60\times60\times6.7\times55=$	13,266
In floor	$0.10\times60\times35\times93=$	19,530
Total		159,223

2. The heat required to raise the product from 65 deg. F. to 125 deg. F., with 500 blocks per curing room, and each room to be raised separately from 65 deg. to 125 deg. is calculated as follows:

Weight of concrete ..... 500×50 lb. = 25,000 lb.
Assume racking equipment will be 10 per cent of block weight ..... 2,500 lb.

Total weight of product to be raised .. 27,500 lb.

Assume specific heat of soft concrete as 0.25. Total B.t.u. required—

$$27{,}500\times0.25\times60=412{,}500 \text{ B.t.u.}$$

A concrete block 8x8x16 in. with two cores 4x5 in. in section, setting on a pallet, will have exposed to the air 760 sq. in. of surface or approximately 5.28 sq. ft. Therefore, the total sq. ft. of exposed surface of concrete in the room $= 5.28\times500 =$ ..... 2640 sq. ft.
Add 10 per cent for racking equipment 260 sq. ft.

Total ..... 2900 sq. ft.

It is assumed the wet concrete will absorb only 1½ B.t.u. per hr. per sq. ft. of surface per deg. difference in temperature. Assume also that in bringing the product from 65 deg. to 125 deg. the air reaches 125 deg. in two hr., while it takes the product six hours to reach 125 deg. This means a mean difference in temperature of 20 deg. between the block and the air in the room while both are being raised from 65 deg. to 125 deg.

Then $20\times1.5\times2900 = 87{,}000$ B.t.u. maximum that can be absorbed per hr. by the product and racking equipment.

The B.t.u. required per hr. $= \dfrac{412{,}500}{6}$, or 68,750.

Inasmuch as the block can absorb under these assumptions 87,000 B.t.u. per hr., it is evident that the block will be able to absorb the 68,750 B.t.u. which is given to it each hour.

To raise the air in one curing room requires:

Volume of room ..... $6.7\times12\times35=2814$ cu. ft.
Volume of block and racking equipment 181 cu. ft.

Volume of air ..... 2633 cu. ft.

Weight of air—$2633\times0.0684=180$ lb.
Specific heat of air—.25.
B.t.u. required to raise air from 65 deg. to 125 deg.—$180\times0.25\times60=2700$ B.t.u.
B.t.u. required per hr. for heating air—$2700\div2=1350$ B.t.u.

	B.t.u. per hr.
Heat losses from rooms	159,223
Heat required to raise products from 65 deg. to 125 deg.	68,750
Heat required to raise air	1,350
Total	229,323

Use 230,000.

Calculating the Boiler

B.t.u. in steam at pressure of 10 lb. (25 lb. absolute pressure)—1160 B.t.u. per lb. of water.

$\dfrac{230{,}000}{1160} = 198$ lb. of steam required per hr.

1 boiler hp. is 34½ lb. water evaporated from and at 212 deg. F.
On a practical basis use 30 lb. of water.
$198\div30=6.6$ boiler hp. required.
Use 15 hp. boiler.

Rules for Making and Handling Concrete Products

1. It is desirable to use materials which will produce the quality desired at the least cost for those materials. The cheapest priced aggregate sometimes requires more cement and, therefore, results in a higher cost of the total materials than some other aggregate. Sometimes the choice of an inferior aggregate results in excessive breakage of product in manufacturing, thereby adding to its cost.

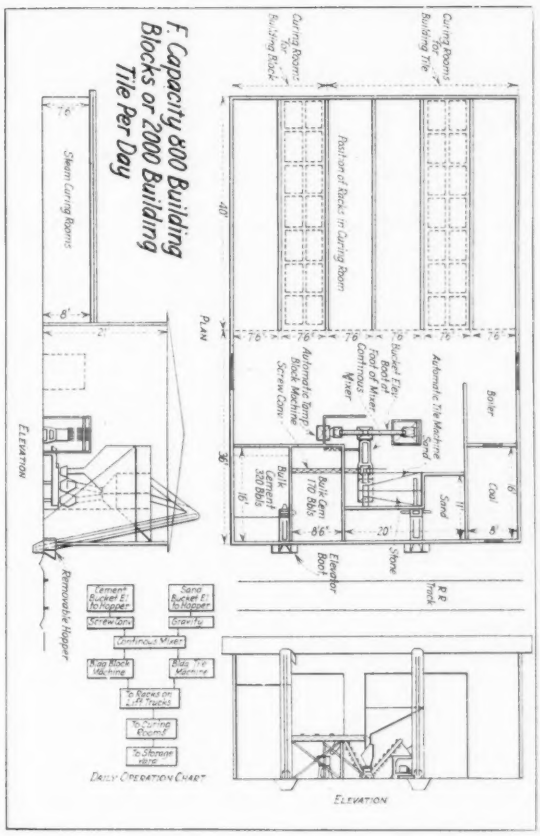
2. Aggregates should be selected with the best possible grading. Generally, the maximum sized aggregate should have a diameter of one-half the thickness of the thinnest wall of the product. As much coarse aggregate as possible; that is, those sizes larger than sand, should be used. Such aggregates do not require as much cement for equal strength concrete.

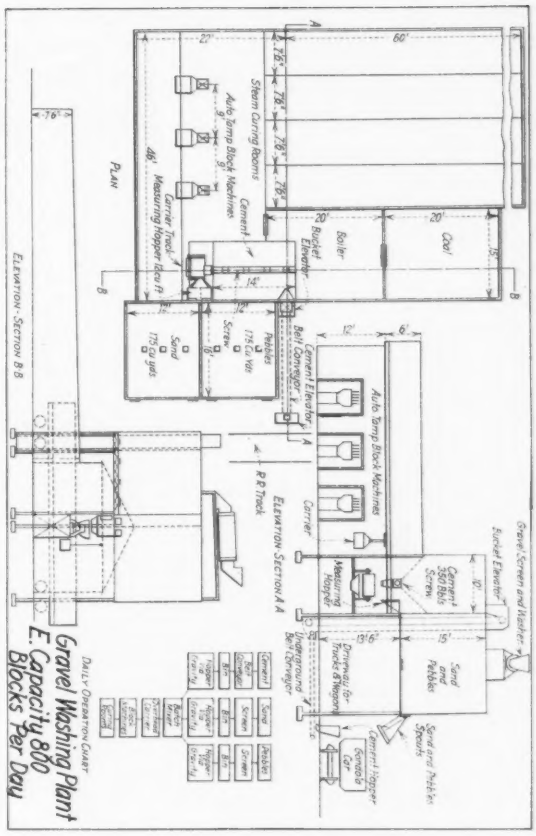
3. The water content of the concrete should be carefully established and kept constant. Tamped or pressed products should be made of concrete having as much water as can be used. In wet cast products, as little water as possible should be used.

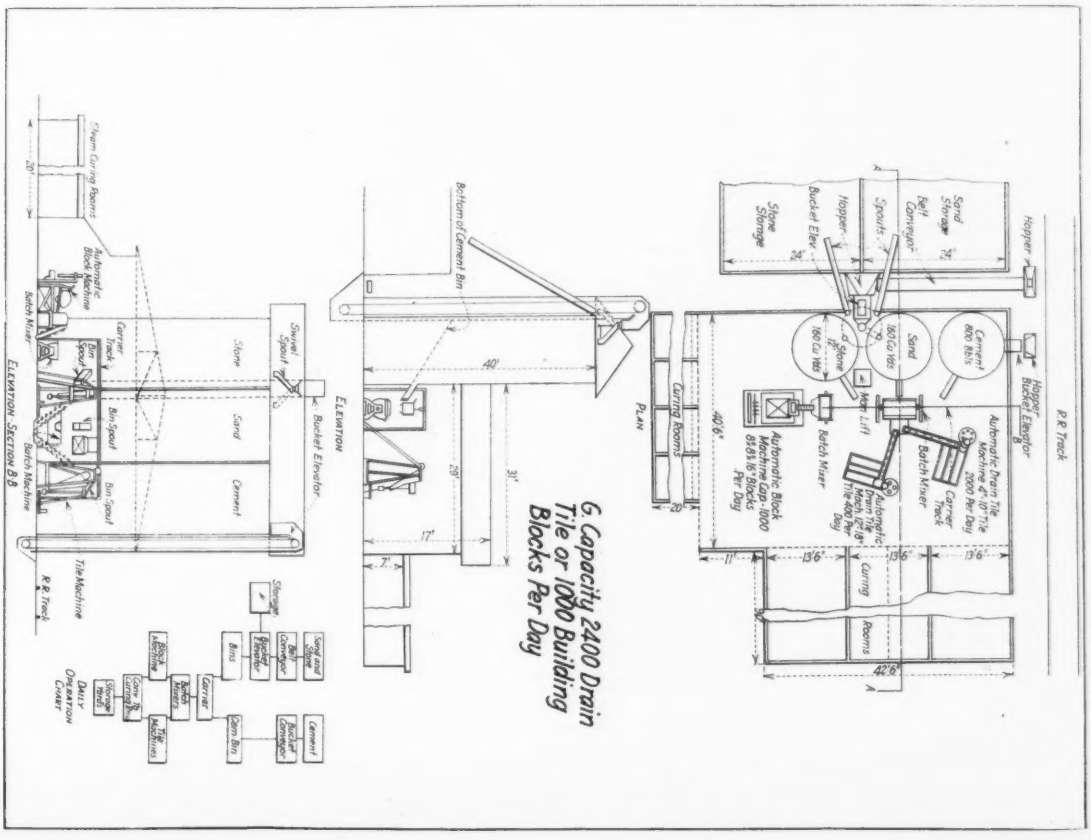
4. After molding the product, it should be cured under conditions which will produce a uniform, satisfactory quality by the time the product is delivered to the purchaser, or at 28 days. Products should be kept at temperatures above 80 deg. for at least 24 hr. before placing them on the outside, where temperatures should not fall below 60 deg.

5. Products that are to be exposed to temperatures below 60 deg. and above freezing, should be kept in a temperature above 80 deg. for not less than 48 hr. Where the outside temperature is expected to drop below 32 deg. within seven days, a longer period of curing should be used. It is believed that higher curing temperatures, say up to 125 deg. F., produce better and quicker results. In hot, dry weather, products should be kept damp by sprinkling for about seven days after they are taken from the curing rooms.

6. Products should be handled no more than absolutely necessary for the first 24 hr. after they are molded. When they are handled, and especially directly after being taken from the machine, jarring is very apt to cause damage, especially to thin products that do not lie flat. It is necessary, however, to remove products from the machine to a place for curing. This is usually accomplished by hand, carts, suspended conveyors, track and car system, or trucks. The lift truck scheme is new and, therefore, naturally there are those who object to it. It is believed that where it has been tried under proper conditions, it has proved successful and economical. It is advisable, however, to have a smooth floor kept reasonably clean. The truck should be of the type which lowers slowly and easily, and it should be equipped with rubber tires and have springs suitable for the load to be carried. Narrow gage lift cars are now being produced which eliminate the necessity of keeping the car itself in the curing chamber. In this manner, the life of the car is increased considerably.







MORE PLANS FOR EFFECTIVE CONCRETE PRODUCTS MAKING

Plant E shows a gravel washer. With this equipment screened and washed gravel can be produced for sale as well as for use in making concrete products. The daily operation charts accompanying each plant design on this and the preceding page of plant designs indicate how the plants differ in operation

Steam for power, heat for buildings, and for other purposes is not included in this steam curing problem, but should be given consideration in the design of a complete products plant.

Amount of Coal Required

Assuming a boiler efficiency of 25 per cent, B.t.u. required per hr. $= 4 \times 230{,}000 = 920{,}000$ B.t.u. per hr.

As each lb. of coal has a theoretical B.t.u. of 11,000, coal required per hr. $= \frac{920{,}000}{11{,}000} = 84$ lb.

Air saturation is calculated as follows:

9.5 lb. of moisture is required to saturate 100 lb. of air at 125 deg. F.

Weight of air in one curing room = 180 lb.

$\frac{180 \times 9.5}{100} = 17.1$ lb. of water required to saturate the air in a curing room at 125 deg. F.

As 159,223 B.t.u. are required per hr. for heat losses in five rooms, we can assume ⅛ or 32,000 B.t.u. per room. This figure will be used in determining whether the air in a chamber will always be saturated.

$32{,}000 \div 1160 = 27.6$ lb. of steam.

As 17.1 lb. of steam will saturate the air, the equipment will be ample.

Radiation System

Assume 2 B.t.u. per sq. ft. of pipe for deg. difference in temperature per hr.

Heat loss in outside wall:

$6 \times 35 \times 0.3 \times 93 = 5859.0$ B.t.u.

Heat loss in inside wall when assuming the temperature in the empty chamber alongside will be 50 deg.:

$6 \times 35 \times 0.3 \times 75 = 4725$ B.t.u.

Heat loss outside end wall:

$6.7 \times 12 \times .6 \times 93 = 4486.0$ B.t.u.

Heat loss inside end wall (plant at 70 deg.):

$6.7 \times 12 \times .6 \times 55 = 2653.0$ B.t.u.

Heat loss floor (ground at 32 deg.):

$35 \times 12 \times .1 \times 93 = 3906.0$ B.t.u.

Heat loss roof:

$12.6 \times 35 \times .45 \times 93 = 18{,}456$ B.t.u.

Total, 29,500 B.t.u.

One sq. ft. of radiation surface will radiate 2 B.t.u. per hr. per deg. difference in temperature.

Radiation required for outside wall $= 5859 + \frac{29{,}500}{2} = 20{,}610$ B.t.u.

Radiation surface for outside wall $= \frac{20{,}610}{2 \times 93} = 111$ sq. ft. of pipe.

Radiation for inside wall $= 4725 + \frac{29{,}500}{2} = 19{,}476$ B.t.u.

Radiation surface for inside wall $= \frac{19{,}476}{2 \times 93} = 105$ sq. ft. of pipe.

Use 1¼-in. pipe.

Each lin. ft. of a 1¼-in. pipe = ⅓ sq. ft. radiation surface.

Therefore, outside walls require $111 \times 3 = 333$ lin. ft. of pipe, or 10 lengths of pipe 35 ft. long.

Each inside wall requires $105 \times 3 = 315$ lin. ft. of pipe, or 9 lengths.

A 4-in. main line should be used from the boiler and 2-in. pipe from the main line to each room. The pipe lines should be designed with check valves so that any one of the rooms can be shut off or be in operation without affecting the other rooms. In order to provide the necessary saturation, a 1¼ in. pipe should be placed near the floor on the inner side of wall parallel with the length of the room running into a dead end. This pipe should be equipped with a spray opening or steam gage and air cock at intervals of three or four feet. With this system, the lines of pipe should be so arranged that the piping along the outside ends will be higher than along the inside ends. This will cause the condensed steam to flow back to the main line and into the boiler.

As radiation boilers are not usually sold on a horsepower basis, it is necessary to figure 10 sq. ft. of heating surface per hp. In other words, where we require a 15-hp. boiler, we would require a radiation boiler having 150-sq. ft. of heating surface. The smallest radiation boiler sold by a large boiler company has a heating surface of 206 sq. ft. and will supply 1600 sq. ft. of radiating surface.

In the problem above worked out, the radiating surface required is only 1062 sq. ft.

Marketing the Product

Having determined upon the plant layout and design of curing rooms, the problem of marketing can be studied. To concentrate on the problem, concrete blocks or tile are discussed. There are a multitude of designs of block and tile, including every conceivable shape, division of air space and interlocking features. Of this assortment there are probably four or five designs that are good and practicable in all respects. Elimination of the poor designs can be made by inspection and a final selection arrived at by investigation and tests. No doubt the information gained would result in further improvement. Such a study should, of course, be made on a basis of:

1. Building loads.
2. Fire resistance.
3. Conductivity.
4. Competition with other building materials.
5. Salability.
6. Acceptance by building trades.
7. Durability.
8. Appearance.
9. Economy in manufacturing cost.
10. Ease in handling and laying up on the job.
11. Strength to prevent breakage in handling.
12. Strength in wall.

With respect to consistency, there are two generally known methods of products manufacture—the dry and the wet. It is generally agreed that the dry consistency is below the consistency giving maximum strength, and the wet is above the consistency giving maximum strength. In the curing of the product some method or other may have considerable bearing on quality cost results. An investigation including these factors would no doubt enable us to arrive at the comparative economy of these methods.

The effect of the method of curing on products is an important subject on which there is little actually known. The consistency of the tamped or pressed concrete product is too dry. The questions that arise are: Is a warmed saturated air beneficial and is it an economical manufacturing operation? What temperature should prevail in the curing chamber for most economical production? To what extent are products improved or harmed by alternate wetting and drying, such as in sprinkling? What happens when products are subjected to various weather exposures and what practice should be followed?

It is generally agreed that with a continuous mixer one man's labor is saved in comparison to a batch mixer, but is a continuous mixer dependable, will it turn out as good concrete constantly as a batch mixer, and is it as economical?

In a products plant where comparatively dry consistencies are used and where, in molding, maximum plasticity and uniform mixing is desirable, is it practicable to mix the concrete longer than one minute? These are questions to be answered by research.

More exact data are needed on the performance of products-making machinery from the standpoint of rate of production, quality, uniformity of product, and mechanical troubles.

A Convention Worth Visiting

QUARRY and pit operators will be more interested in this national convention and exposition of the American Mining Congress than ordinarily. E. C. Porter, convention manager of the association, has announced that special steps are being taken to interest men engaged in the production of non-metallic minerals. The convention will be held at The Public Hall in Cleveland, perhaps the finest exposition and convention building in the United States, October 9 to 14, and there will be a large number of exhibits to interest and instruct rock products men.

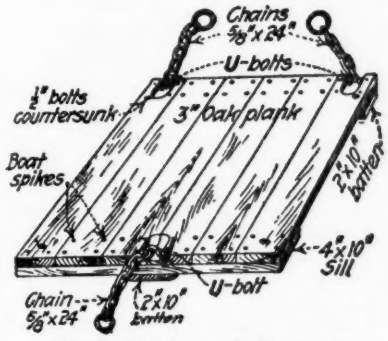
Hints and Helps for Superintendents

How to Determine Truck Loads

A PORTABLE weighing instrument has been designed for conveniently weighing trucks that are suspected of being overloaded, says *Engineering and Contracting*. Each loadometer has a screwjack mounted on a plunger which operates in an oil-filled cylinder. By jacking up the truck with these instruments the weight is transferred to the instrument; the plunger indicates the pounds weight on a high-pressure gage connected to the oil chamber. The bodies of these instruments are of special aluminum alloy and the total weight of one loadometer is 40 lb. The loadometers are used in pairs by some companies, and in others, in order to save time, four constitute a set.

This Plank Skip Carries 50 Sacks

HERE is a useful flat cement skip, writes G. W. McAlpin in *Engineering News-Record*. The deck of this skip is of 3-in. oak plank boat-spiked to sills 4x10 in. One ½-in. bolt in each corner adds stiffness. Instead of links short chain lengths are used to provide fastening for a three-way chain. The U-bolts



Plank skip for sacked cement

to which the chains are attached are set in recesses large enough to permit the chains when slacked off to fall flush with the deck. In this way no obstacle which might tear the sacks is presented when the skip is dumped. The short chains, being pliable, will also pull out from under a pile of sacked cement more readily than the old style link. The heads of the U-bolts are protected by 2-in. oak battens, which prevent them catching and tearing the sacks when the skip is landed on a pile.

The three chains are of the same length and fasten by means of a large link to the hooks of the usual three-way chain. The length of the chains permits the hook in the three-way chain to clear to the top of the pile. A load of 50 sacks of cement is usually carried on the skips, but as many as 100 sacks have been carried without straining it.

Cutting the Coal Bill

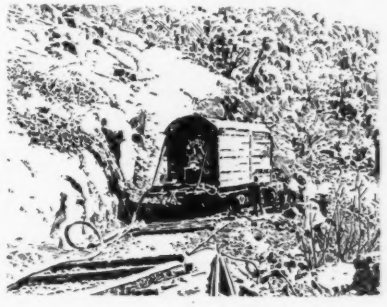
AN economical utilization of the latent heat-units of coal is the aim of every operator who generates power who has been taught the importance of scientific control by the frequent examination of the waste products. *Mining and Scientific Press* says that there are, however, scores of users of coal-fired boilers who fail to appreciate the importance of accurate testing; many of these gage the performance of a boiler by the appearance of the gases coming from the stack, being unaware of the fact that an avoidable waste of coal may be occurring whether the flue-gases be transparent or opaque with particles of unconsumed carbon. The loss of fuel may be traceable to unburned coal in the ash and to an improper proportion of certain gases in the stack. The former loss is easily noticed and readily controlled. The loss in gaseous form is often overlooked; the proportion of carbon monoxide and carbon dioxide present can be determined only by chemical tests. Now that a compact and simple apparatus is available, at a comparatively small cost, there can be no excuse for an unnecessary wastage of gaseous fuel, even in small plants. By using such an equipment, the tests for carbon dioxide are made automatically and at a negligible expense.

It is difficult to estimate the average performance of boilers; but it is probable that in small plants, less than 60 per cent of the available heat from the coal is utilized for the making of steam. Over 30 per cent of the remainder may be lost in the gases that escape from the stack. This loss may be considered from two viewpoints. Part of it is due to direct loss of heat, in consequence of faulty design, lack of cleanliness, and other less important factors; but usually the greater proportion arises from a neglect to regulate combustion properly. Control of the composition of the escaping gases is only possible when the operation of stoking and the manipulation of draught are guided by quantitative data as to chemical composition, with particular reference to the proportion of carbon dioxide present.

The standard recorders are designed to abstract a measured volume of the flue-gases at definite intervals, subjecting it to an absorptive treatment, and recording the result on a chart. The importance of such control is shown by the fact that, in the case of a boiler of an average load of 500 hp., burning coal at $4 per ton for 10 hr. per day, the saving in fuel per annum by increasing the proportion of carbon dioxide in the flue-gases from 7 to 9 per cent may amount to over $1000.

Protecting the Steam Shovel During Blasting

THE Southern California Edison Co. engineers found that a housing of 2-in. planks in double thickness around the steam shovel used for mucking was a great convenience in constructing a road along a steep sidehill where heavy blasting was required. During the blasting operations it was not necessary to move



Steam shovel protected against flying rock

the shovel thus protected back as far as otherwise would have been necessary to avoid danger from flying rock fragments. The planking also saved the shovel from damage on those occasions when rocks, loosened by the heavy blasting, came down the steep hillside.

Welding a Roller

THE New Jersey Construction Co., Hackensack, N. J., had a roller that was fractured on one of the spiders bolted to the wheel hub sides and keyed to the axle. The diameter of the axle was 4¾ in.

Instead of machining off the collar of the weld which was made—needed to permit the spider to fit over the weld—the end of the axle was cut off near the middle of the shaft and a new oversize billet 30 in. long was welded on and then machined to 4¾ in. in diameter. This welded collar did not interfere in any way nor did it need machining.

The spider, which had been removed before welding, was replaced after a new keyway had been cut by a new spider. It was first heated and then shrunk on. The axle was then put back on the roller.

The Removal of Clay from Sand and Rock

No. 5—The Necessity for Using More Than One Wash Where Low Residual Clay Contents Are Desired—Progressive Use of Water, and Washing by Displacement

By Edmund Shaw
Allen Cone Co., El Paso, Texas

IN No. 4 of this series (see ROCK PRODUCTS for March 25) the theory of washing was discussed, but only the use of water in a single wash was considered. This is the common practice in washing concrete sand and other materials which contain but a relatively small amount of clay. It is also the practice in those cases in which the crude material is accompanied by a great deal of water on account of the method of mining used, as with pumping sand by suction dredges, for example.

But it was shown that large quantities of water must be used in order to secure a very low residual clay, and that, in fact, it is theoretically impossible to wash the sand absolutely free from clay in a single wash, as the water required runs to infinity. Hence the necessity of using more than one wash where very low residual clay contents are desired.

Using More Than One Wash

We find that this is borne out in practice. Just as it is the practice to use one wash on concrete sand, which is mined with a low clay content in the crude, so it is the practice to use two or more washes in washing phosphate rock, where the clay content of the crude is very high. In washing silica sand where, although the clay content of the crude may be low, it is necessary to reduce the residual clay practically to zero. (It should be remembered that in this series the word "clay" is used to include all mineral substances that are removed by washing.) In the washing of silica sand, for example, it is the usual practice to pump or elevate the crude material to settling bins along with considerable water, the greater part of which goes off as an overflow, taking most of the clay along with it. The sand is then sluiced from the settling bin and passed through scrubbing and dewatering devices along with more water, the greater part of which is again removed as an overflow. This reduces the residual clay to a very small amount, but sometimes a third wash is given, leaving the sand clean and white, with its clay content very low.

Calculating the Effect of a Second Wash

In No. 4 of the series it was shown that the effect of a single wash may be calculated, and that it is possible to calculate the water required to reduce the residual clay to any required amount. A rule was given for making this calculation. We may use this rule in calculating the effect of a second or of any number of washes.

As the best way to illustrate the use of the rule is by example, we will take a simple problem, such as was used to show the effect of a single wash.

Let us suppose that the crude material contains 100 tons of sand combined with 10 tons of clay, and that we want to wash out nine tons of the clay and leave one ton with the sand, which is practically a residual clay content of 1 per cent. The rule given was to divide the total clay present in the crude material by the amount to be left as residual clay, and to multiply this quotient by the amount of residual water which would be left in the sand.

The total clay is 10 tons and the residual clay is 1 ton and $10 \div 1 = 10$, the quotient required. The residual water, as previously explained, is 43 per cent of the weight of the sand, or 43 tons—$10 \times 43 = 430$, the tons of water that will be required. The percentage of residual clay, it will be noted, is practically 1 per cent.

Now let us consider the effect of dividing this water into two washes of 215 tons each. Of course we shall have to mix the sand and clay thoroughly with each wash and settle and take off an overflow twice instead of once, so whatever we gain in efficiency must be paid for in the extra work involved. That, however, is not the point we are considering at present.

Each wash of 215 tons is five times the tonnage of the residual water, so we shall remove four-fifths of the clay present with each wash. We had 10 tons of clay to start with, so we shall take away four-fifths of 10, or eight tons with the first wash.

This will leave two tons of clay with the sand. We will now apply the second wash of 215 tons, and this will take away four-fifths of the clay as before. Four-fifths of two is 1.6 ton, and so our second wash will leave only 0.4 ton of clay in the sand. The residual clay content will therefore be less than half of what it was when the water was used in one wash.

A little calculation will show that we might have obtained the same effect with 258 tons of water divided into two washes that we obtained with 430 tons in one wash. Each wash is three times the residual water, so we will remove two-thirds of the clay which is with the sand at each wash. After the second wash the clay will be reduced to 1.1 tons, which is almost as small an amount as was left after applying the 430 tons in one wash.

Using Three or More Washes

In order to study the effect of three washes, we will take a different set of quantities so that we may obtain figures that may be easily divided by three. We will assume that we have 12 tons of clay in the place of 10, combined with 100 tons of sand as before. And we will also assume, as before, that one ton of clay is to be left with the sand. To do this with one wash, we must use 12 times the weight of the residual water, or 516 tons.

If we divide this 516 tons into three washes, each wash will contain 172 tons, and as this is four times the weight of the residual water, each wash will remove three-fourths of the clay present. The effect of these washes will be:

No. of wash	Clay removed	Clay remaining Tons
1	9 tons (¾ of 12)	3
2	2.25 tons (¾ of 3)	0.75
3	0.5625 tons (¾ of 0.75)	0.1875

So, by dividing the 516 tons of water into three washes, we have reduced the residual clay from 1 ton to 0.1875 ton, or less than one-fifth.

To understand just what this means in economy of water, we will calculate the amount of water that would be required to reduce the residual clay to this amount in one wash. Dividing 12 by 0.1875 gives us 64 as the quotient by which we must multiply the weight of residual water, and $64 \times 43 = 2752$. In other words, we

should have used more than 5½ times as much water in one wash to gain the same effect that we obtained in three washes.

We might go on and calculate the effect of dividing the water into four, five and six washes, but this is not necessary. Enough has been said to show the underlying principle, which is:

The more washes into which the water is divided, the less the water that will be required to produce a given percentage of residual clay.

Limit to Dividing into Washes

While the above holds true as a general rule, there is a limit to which it can be carried in practice. It would be absurd to carry it to a point where each wash would be less than the residual water, say, that half the residual water was applied to a wash. The first and second washes would take off no clay whatever, as there would be no overflow. And the third wash would take off only one-third of the clay present. It is quite obvious that dividing the water into too many washes cannot be made to pay, no matter how great an economy in the use of water is desired.

As was mentioned in an earlier paragraph, whatever we gain in economy of water by dividing into washes has to be paid for by additional labor and power and a larger and more complicated plant. By making the process of settling and taking off an overflow continuous we can reduce this extra cost to a minimum, if we are careful to combine it with good plant design. A well-designed plant having a continuous flow of material from start to finish, with the settling and removals of overflows entirely governed by automatic devices, may divide the water into several washes and yet use less power and labor than a poorly designed plant which uses only a single wash.

Progressive Use of Washes

To obtain the most economical use of the water it is not sufficient to divide it into washes. The water should be used progressively—that is, the washes used to remove small amounts of clay (rinses) should be used a second time to remove larger amounts of clay.

The method which we have spoken of here as progressive washing is used in a great many industries. We can find an excellent illustration of it in one of the various methods of cleaning clothes by gasoline or a similar grease solvent. Here the gasoline is placed in a series of five or six cans or tall tubs. The dirty clothes are placed in the first and washed and then the excess gasoline is wrung out of them and they are transferred to the second, and so on throughout the series. So little is left in the clothes to be removed by the time the last can is reached that it contains practically pure gasoline. When the gasoline in the first can becomes too dirty for further use, the first can is taken out and the second put in its place. All the other cans are moved up one place and a can of fresh gasoline is placed at the bottom of the line. It will be seen that there is a regular progression of both clothes and gasoline through the series, the clothes becoming cleaner as they move from the first to the last can and the gasoline becoming dirtier as the cans are moved up from the last place to the first.

It is possible to make this process automatic and continuous. The clothes can be wrung out and passed from one can to the other and the gasoline made to flow slowly from one can into the other in the opposite direction from the passage of the clothes. The last can of the series will receive a constant inflow of clean gasoline, while the first, into which the clothes are first put, will constantly overflow very dirty gasoline. In this way the same result will be obtained without the labor and trouble of shifting the cans up one place every time the gasoline in the first has to be removed.

Application to Removal of Clay

We can apply this same principle to the removal of clay from sand and rock—in fact, it is so applied in practice. The water used in giving the last washes, when the water is divided into two or more washes, is to all intents and purposes as good as clean water for the first wash, which removes the greater part of the clay.

To figure out exactly the effect of using progressive washes is a rather complicated problem in algebra. But we do not need to figure exactly the effect, and the percentage of clay left behind after each wash to sufficintly understand what the effect will be.

In order to do this let us consider the washes in the last example given—that of 12 tons of clay combined with 100 tons of sand, washed with three washes of 172 tons each.

It will be noted by reference to the table given that the third and last wash removed 0.5625 ton of clay. If, instead of being thrown away, it had been used as the second wash, it would have left one-fourth of this with the residual clay since the tonnage was four times that of the residual water. One fourth of 0.5625 is 0.1406. We must add this to the residual clay we have previously figured as left after the second wash, which is 0.75 ton, making the total 0.8906 ton. And if we have used this second wash for the first, we shall find, if we calculate it in the same way, that the residual clay after the first wash was 3.225 ton instead of 3 tons. The final result would be that the residual clay would be about a fourth higher; in round numbers, it would be raised from 0.18 to 0.22 ton.

There is a slightly higher residual clay by this method, *but only one-third as much water has been used.*

Where the water is applied in washes, the most economical way is to use the last washes, which contain very little clay, to wash the sand at first while it contains a great deal of clay.

Use of Water by Displacement

The method of using water thus far discussed and described is that of taking off an overflow. It is possible, however, to apply the water in another way than stirring it up with the sand and clay, allowing the sand to settle, and then taking off the overflow. It can be so applied that the clean water displaces the clayey water instead of diluting it, as in the methods so far described.

There are two or three ways in which this may be done, but the principle may be illustrated by describing a very simple form of apparatus involved. It takes advantage of the different settling rates of sand and clay just as all forms of washing apparatus do.

Suppose that we have a tall tank filled with water. In the bottom of the tank we will put a number of pipes each of which has holes through which water is admitted. This water will rise slowly through the tank and overflow at the rim of the tank. Now we will turn in a mixture of sand and clay which has been agitated with sufficient water to prevent it from becoming sticky and pasty. This mixture will spread out through the water in the tank and be diluted by it.

If the water in the tank was still water, the sand would settle out and fall to the bottom of the tank; the clay would settle, too, but at a much slower rate. In this case the water is slowly rising in the tank and we can regulate the rate of this rise by the rate at which we admit the water. In order to get the effect we want we must admit the water at such a rate that it will rise more slowly than the settling rate of the sand but faster than the settling rate of the clay. The clay will then go out with the overflowing water while the sand will fall to the bottom in the clean water, which is continually rising and displacing the water containing clay.

Of course we must add certain things to the tank to make it a practical machine. We have to provide some way to remove the sand as fast as it accumulates at the bottom of the tank, and also a method of protecting the holes in the pipes from becoming clogged by the falling sand. These details, however, do not belong here so it is enough to say that they have been provided for in the practical form of the apparatus which has been so roughly described. Although it is not much in use, the method of washing by displacement is a thoroughly practical one.

In the form of apparatus just described the sand settles freely and in separate grains. There is another form in which sand is washed by displacement, in which the water is admitted into a mass of sand grains and the sand washed by what may be termed a slow, upward filtration.

In this apparatus we have the sand in the form of a quicksand, which is slowly flowing toward a discharge orifice. As it flows it has to pass a number of orifices through which water is being admitted very slowly so that it cannot lift the sand but is still able to percolate through the spaces between the grains and wash the clay upwardly as it goes.

This particular form is known as a hindered settling apparatus, and the reader is referred to "Sand Settling and Sand-Settling Devices," published in recent issues of Rock Products.

(To be continued)

Who Gets the Cement Contract When Bids Are Uniform?

PUBLIC interest in cement prices and their uniformity is so keen that *Engineering News-Record* asked the Atlas Portland Cement Co. to state "the considerations aside from price that determine the award of a contract." L. R. Burch, assistant to the president, replied as follows:

"The answer must be given in one phrase—salesmanship and service—personal and institutional. This is a very broad way of treating the matter, however, and in order to make clear just what cement salesmanship comprises and at the same time illustrate the keenness with which cement manufacturers follow up possible business, it might be well to note briefly the means employed in connection with a recent contract which is a typical case.

"Bids were submitted in the usual way and immediately the machinery of the sales department was set in motion long before the date on which the bids were to be opened.

"The purchasing agent was seen by the local salesman in charge of the territory in which the buying was to be done and an investigation was made of the prospective buyer with a view to discovering possible points of reciprocity and personal connections.

"Conditions of delivery were carefully looked into to see if more satisfactory shipments could be made by us than by a competing company. In this connection the matter of car supply, rail routing, junction points and time in transit play an important part.

"As a further service, the sales force, aided by the technical department, lent valuable assistance to the purchaser in locating convenient sand and gravel deposits, and giving information on local storage and delivery facilities.

"An effort was made to locate the real buyer, for it frequently happens in the letting of large contracts that the purchasing agent does not have the final say and methods have to be employed which differ radically from those otherwise employed. As a matter of fact, each contract presents problems which are unlike any previously encountered; consequently there is no one method which will fit every case.

"The matter of storage and production capacity at the manufacturer's plant must also be considered and brought to the purchaser's attention, for with a heavy demand for cement for public work, the ability of the company to carry sufficient stock on hand to cover any call for deliveries is of the greatest importance.

"The heads of the sales department naturally have knowledge of all bids and not only give their attention to the direction of the solicitation, but where they believe it will be to advantage to take up the matter personally, lending the prestige of their positions and ability to supplement the efforts of the local and general salesmen.

"The point I want to bring out is that in the efforts to make a sale in the face of such strong competition as prevails in the cement industry, nothing is left undone by a sales department costing more than a million dollars a year. That this is the case will be maintained by architects, engineers, contractors and dealers who have been in any way connected with cement jobs and who have had occasion to remark the active manner in which a prospective buyer is pursued by each bidder.

"Which gets us back to the short form of answer, that the consideration determining the award of a cement contract, where the quality is standard, the market highly competitive and the prices in consequence fairly uniform are salesmanship and service of a highly developed character."

An Air-Swept Mill

J. E. KENNEDY, of the Kennedy Van Saun Mfg. and Eng. Corp., who has been connected with the stone industry for the past 35 years, recently announced an air-swept combination ball and tube mill.

It is a known fact among all users of ball and tube mills that most of the grinding is accomplished in the first few feet of the mill, but owing to the necessity of getting a uniform product of a high degree of fineness, it is usual practice to make the mill long in order to overcome the interference of the already palpable powder which is inert in the mill after reaching that stage until it is finally discharged.

The new air-swept combination ball and tube mill, according to the manufacturer, has a short compartment for heavy grinding using steel balls of a diameter of 5 in. and smaller to suit; a partition with ample openings for the passage of materials and the air blast; and a second short chamber using small steel balls of 1 in. or ⅞ in. for fine grinding. The air is drawn through the tube mill by a heavy fan and discharged with the dust into a dust collector and thence to the bins. Lifters are supplied at the discharge end to further facilitate discharge. It is claimed by the makers of this machine that 50 per cent additional production can be obtained by thus separating the ground particles as soon as they have reached the proper degree of fineness. A great saving in cost is claimed especially in the pulverizing of cement, clinker, coal, and limestone for fertilizer and for other purposes.

The heavy duty balanced slugger rolls recently put out by this same company and announced in the January 28, 1922, issue of Rock Products, are to overcome the difficulties encountered at plants where pieces of iron or steel get into the crusher, as in slag-crushing plants. The speed of these rolls was incorrectly given in the previous announcement, due to a typographical error. The rolls are run at a peripheral speed of 900 ft. per min.

Federal-Aid Roads Need $100,000,000 Yearly

THE following is quoted from a bulletin of the American Automobile Association:

"Thomas H. McDonald, chief of the Bureau of Public Roads, recently stated that if the people of the United States desire to see a completed system of 7 per cent of the highways of the country—175,000 miles—within the next decade, in his judgment Federal-air appropriations would have to be continued at the rate of $100,000,000 a year. The program will take 15 years at the rate of $75,000,000 a year, and 20 years at the rate of $50,000,000 a year.

"Owing to the policy of economy and retrenchment which prevails in Congress, efforts will be made to eliminate these appropriations from the Post Office Appropriation bill. Prompt action in placing this matter before their senators and members of Congress is desired.

How a State Highway Department Inspects Its Material

By H. F. Clemmer
Engineer of Tests, Illinois State Highway Department

Personal Inspection at the Plants by Competent Inspectors from the Department has Brought About General Satisfaction to Both the Producers and the Highway Engineers

THE best way to carry on any business relationship, I believe, is to be personally acquainted with those with whom you deal, for it is often difficult to read between the lines.

Since I have been with the Illinois Highway department, the work of the Bureau of Tests has so increased and our investigational work has made such demands on my time that I have not been able to be out in the field and visit many of the plants. Today, I believe our work is so arranged that I can visit many plants this season.

I want to explain briefly the manner in which we carry on our inspection of materials. Many of you are acquainted with the work of this Bureau, but I wish to call it to your immediate attention and assure you that any suggestions you may make will be appreciated. Any change which would particularly benefit you will in the end prove of value to this department.

Previous to 1920 we carried on the inspection of materials at the place of construction. As you know, due to the delays and loss incurred in making necessary rejections, this method was unsatisfactory to both the materials men and the Highway Division.

At the beginning of the construction season of 1920 the department started our present method of handling the work—that of performing all inspection at the producer's plant. We place an inspector, who passes on the material before it is shipped, at all of the material plants—cement mills, sand and gravel and stone plants, etc.—furnishing materials for use on Illinois highways. As these plants are scattered widely over this and the adjoining states it was found difficult to keep in close touch with our inspectors. Check analysis were continually being made in the laboratory on their work, but it was impossible to get the proper co-operation by correspondence.

Duties of Testing Engineers

Beginning the 1921 construction season, we placed district testing engineers at the district engineer's office. It is the duty of these engineers to supervise the work of each inspector in his district, and to co-operate with the materials men and the district engineers on any of their materials problems. This arrangement has helped considerably to bring about a closer relationship. There have been times when our inspectors did not carry on their work properly, but I believe this has been due to the individual and not to our method of inspection.

In 1920 it was difficult to secure any kind of inspector. In 1921 the condition of employment was improved, and today we are able to employ the very best of engineers. Regardless of their previous training, we give these men a two weeks' course in the inspection of materials, emphasizing our manner of handling the work. At the end of this course they must pass a rigid examination, after which they are placed in the field under the direct supervision of a district testing engineer.

We realize that if an inspector is placed at a plant who is able to help get the maximum amount of satisfactory material from it, he not only proves himself of value to you but to the state as well. We impress it upon our men that the successful inspector is not he who merely checks up the material accepted, but he who is capable of assisting in getting the maximum amount of satisfactory material from the plant. If we can work together our inspectors can help you as well as the State in getting the materials for the thousand miles of road for which the 1922 program calls.

The government requires that we file reports on all materials used in Federal aid projects. In general, we have done this for all our work, but in some cases we have fallen short of 100 per cent efficiency. This year we are working on a 100 per cent basis. We have instructed our construction engineers not to use any materials not reported by this department. This may cause a little difficulty; nevertheless, we must do, it, and we ask your earnest co-operation to the end that your superintendents be sure that every carload of material for Illinois highway work is offered our engineer for inspection. We cannot afford to carry on inspection at both the plant and the construction site, therefore it is absolutely necessary that every carload of material be sampled and inspected at the plant.

Investigational Work

The Highway Division has been carrying on considerable investigational work. Besides the study of the design of pavements conducted at the Bates experimental road, a study of concrete along many lines has been made. Our Bureau has been in touch with several of your association members and they have been interested and given us material assistance. I believe it would be of value to both the materials producers and the state if there were a research work committee from the association working in conjunction with this Bureau; the problems brought to your attention would doubtless be of interest to us. We have a competent investigational force and opportunity for carrying on a large program.

The Bureau issues each month an informal letter, "Straight from the Laboratory," which tells of the work done during that time. This information is entirely informal; not even a preliminary report. If you desire this letter we will gladly place your name on our mailing list.

Some of the Bureau's Projects

Let me tell you briefly of some of the projects in which we are interested. For instance, there are many patented products offered for use in concrete work.

Some of you have seen the exhibit of a maker of these products at the Good Roads Show. It is claimed that by the addition of 4 oz. of the product to 1 sack of cement to 5 parts of the earth material found along the way, the resulting mixture will give a satisfactory road surface. Due to the widespread propaganda of that company, this Bureau felt that the product should be thoroughly tested out. Numerous specimens were made under the supervision of a representative of this company. From the results of the tests it was proven that roads so made are out of the question insofar as their construction in Illinois is concerned.

There is another product made which, when applied in solution to a concrete surface, is supposed to harden and densify it. If this were true the material would be of considerable use in hardening the edges subjected to traffic and in cases where concrete has not properly set. Five hundred feet of pavement have been treated with this material and are under careful observation. Any results from the application of this chemical will be noted in our monthly letter.

Concrete Aggregate Tests

We are endeavoring to find more satisfactory methods of making tests on concrete aggregates and are interested in advancing a test to determine the amount of soft material present in sand. I will not go into detail regarding our proposed method, but I believe that the test will prove satisfactory.

You will be interested in our study of the setting of concrete under low temperatures. At the last of the construction season there is often a few hundred feet at the end of some sections which we want to complete but do not believe that the concrete should be laid without taking proper precautions. We have found that by the addition of 2½ per cent of calcium chloride the concrete is kept at a temperature which will insure proper setting before it can be affected by a temperature as low as 20 deg. F. Our program for this work also includes the study of concrete placed on frozen ground as well as on subgrade, which freezes soon after the concrete is placed. It seems probable that the concrete placed on the frozen ground would have more uniform support at all times than the concrete placed on subgrade.

We are deeply interested in the proper curing of concrete. Over 450 specimens were made and tested for transverse strength, every known method being used in the treatment. Such methods as the covering of the concrete with asphalt or with sodium silicate—either of which would prevent evaporation—were used as well as many other methods employing various percentages of calcium chloride. The greatest strength was obtained in those specimens which were sprinkled in the proportion of 3 lb. of calcium chloride per square yard of surface. This method of curing brought greater strength to the concrete in 14 days than did the wetted earth method at the end of 28 days.

We are interested in knowning the effect of repeated loads on concrete and our laboratory has a very satisfactory machine for the study of this phenomenum, the fatigue of concrete. We have already obtained some rather surprising and quite conclusive information.

Gradation of Aggregates

One of our largest investigations during the past winter has been as to the effect of the gradation of aggregates on the transverse strength of concrete. Transverse specimens and compressive specimens requiring over 12,00 separate weighings have been made for this gradation investigation. The results of this program will allow the study of many phases of concrete work. I had expected to be able to tell you definitely what our new specifications would be, but we have not had opportunity to fully consider the recommended change. However, we will admit coarse aggregate of much smaller maximum size than formerly required but we will be very rigid in our gradation of the fine material. This change in specifications will mean much in increasing gravel-plant production and we are pleased to be able to make this change.

This is not merely a message to Illinois producers, though it was presented first to members of the Illinois Concrete Aggregate Association at its March 16 meeting. This article will help every producer of materials to understand his relations with state and federal government purchasers, and it may help him to secure in his state better inspection methods. Besides, the author's account of experiments with patented preparations, with the setting of concrete at low temperatures, with curing, fatigue of cement, and gradation of aggregates, makes this article one you can scarcely afford to miss.

The tests and investigational work which have been carried on in the past have for the most part been a study of concrete under compressive stresses and it has been shown that there is no direct relation between the compressive and transverse strength of concrete. We are carrying on all of our work with 8x12x30 in. transverse specimens as well as 6x12 in. compression cylinders.

Concrete Fatigue

A year or more ago, in connection with our study of concrete fatigue, we were loading the corner of a pavement slab, and noting the deformation and deflection under each load. As our method of applying the load was rather slow, it was necessary to continue the work until late in the evening. On studying our data we were surprised to note that the edge of the pavement was higher under load at night than it had been without load in the afternoon. We thought our notes must be wrong, but further investigation proved that there is a curling action of the pavement slab due to the uneven expansion from temperature changes of the concrete. During the heat of the day the edges of the pavement are curled down and the center may not be supported by the subgrading, while at night, when it is cooler, the edges will be curled up and at times out of contact with the subgrade. In this condition the pavement would be acting as a slab in cantilever, and this is the principle upon which Illinois is basing the present design.

Mr. Pierce has mentioned our work on on the Bates experimental road. I trust you will find time to visit our laboratory and give us the opportunity of showing you the work we are doing. Then we would become more personally acquainted and be more able to read between the lines of our correspondence.

Two Japanese Visitors

JAPAN'S sand and gravel methods are not equal to those in common use in America, according to J. Furukawa, construction engineer, and T. Kuroda, bridge engineer, of the Japanese Government Railways, who were recent visitors at the office of Rock Products. These men are visiting this country for the purpose of studying American practice in sand and gravel production and plan to visit a large number of plants, especially where hydraulic methods are used.

Gravel is taken almost altogether from river beds and embankments along rivers in Japan. There are a large number of rivers and it is scarcely necessary for the Japanese to produce crushed rock for any purpose, though occasionally this is done when the distance from sand and gravel deposits along the rivers is too great.

Hand methods are used almost entirely in the production of sand and gravel. The digging, screening, and handling are all accomplished by manual labor. The most customary method employed is to screen the gravel in the embankment, load on to narrow-gage cars, haul to the storage piles, which are located at an average distance of half a mile from the embankment, then load from storage piles into railroad cars for transportation. Practically no mechanical equipment is used in the production of Japanese sand and gravel.

New Concrete Brick Company in Northwest

A SYNDICATE of well-known business men in Seattle has been formed to take over and reorganize the Decorative Brick Co. of that city. The new company will market the Shope brick under agreement with the Shope Concrete Brick Co.

The plant and offices are located at 1565 Northlake avenue, and the immediate turnout will be 30,000 brick a day. The officers of the new firm state that 85 per cent of the brick now being used in Portland are Shope brick.

Will Freight Rates Change?

A NUMBER of interesting opinions on the effect of the February 27 decision of the Supreme Court, upholding the power of the interstate commerce commission to regulate intrastate rates where discrimination interstate traffic is shown to exist, have been received by Secretary Sandles of the National Crushed Stone Association. His account of the situation, and the comments, are given below:

In some states, railroads accepted the orders of state commissions to lower freight rates, but did so under protest and started a contest in the courts to nullify these state orders. In many instances quarrymen had worked out satisfactory rate adjustments with the railroad companies. In many instances state highway contracts had been awarded and accepted by contractors on the lower freight rate basis as fixed by state commissions. Since the Supreme Court announced its decision, interested parties are asking whether the lower rates fixed by state commissions will be cancelled and the regular rates as approved by the I. C. C. will again become effective.

On this subject our president, Mr. Eames says: "My judgment would be for middle west quarrymen to let matters rest with railroad officials. I do not feel that they want to raise the present rates as they are anxious to get all the business they can and will concede lower rates where possible."

In reply to our letter to the Interstate Commerce Commission reference the effect of the Supreme Court Decision, the I. C. C. Secretary, George B. McGinty, says: "In reply you are advised that I have no information as to what changes will be made in existing state rates."

Our ex-president, John Rice, says: "We have had no intimation from railroads as to their attitude reference United States Supreme Court Decision. I am inclined to believe, without slightest information on which to base such an opinion, that they will not interfere with present rates in New York and New Jersey unless to make correction in some instances which hits shippers particularly hard."

F. W. Schmidt, Morristown, N. J., says: "I hope railroads will not raise rates. I think they are satisfied with the decision of New Jersey authorities as they have utilized this in establishing rates in the Eastern District outside of New Jersey. The whole rate question in my judgment will hinge upon the decision of the Labor Board which we hope will come in the near future."

Harry F. Denig, Traffic Manager, Ohio Farm Bureau, says: "There will be no advance in intra-state rates on agricultural limestone as result of the decision of the Supreme Court of the United States in No. 206 of the October term, 1921, known as the Wisconsin Case, until certain procedures have been complied with."

W. L. Sporborg, Syracuse, N. Y., says: "I have been in touch with traffic officials and my present impression is that it is not the intention of the carriers to bring about an advance in the level of rates. I understand nothing is expected to be done until the Interstate Commerce Commission has rendered its decision upon the general case regarding hearings held January and February. The carriers are prepared to consider any specific proposition that may be put to them upon its merits. This is different from last year when they were inclined to defer any action because of its possible effect upon the general rate situation. I do not think they will insist on canceling all concessions made."

Gray Silver, Washington representative of American Farm Bureau says: "Our group will continue all along the line in whatever we can to work for reduced rates. Freight rates are way out of relation to the service given by the railroads and must be gotten back into line. Such talent must be found either in the railroad organization or out of them as will put railroading on a different basis from what it is at this time."

C. B. Hutchings, traffic manager, American Farm Bureau Federation says: "As I read the decision of the U. S. Supreme Court in the Wisconsin case, there will be no blanket revision of state rates. On the contrary this provision merely secures to the I. C. C. the authority to compel state commission to bring their state schedules into conformity to inter-state rates. So far as agricultural limestone is concerned I do not at present anticipate any difficulty, except in the case of Ohio where railroads seem to be rather refractory. The American Farm Bureau intends to continue its efforts to secure reductions in freight rates."

Condemn Different Rate Levels on Similar Hauls

ON unusual recommendation has been made by Examiner Wagner in a report on No. 12906, Interstate Sand and Gravel Co. vs. Chicago, North Shore & Milwaukee Railroad, in that he has recommended that the commission hold unreasonable interstate rates on sand, gravel and earth strippings from Libertyville, Ill., to points in Wisconsin on the defendant's line to the extent they are in excess of the rates applied for similar hauls intrastate in Wisconsin.

The condemned interstate rates begin with 50 cents per ton for 5 miles and end with 80 cents for 40 miles. The Wisconsin scale begins with 40 cents for 5 miles and ends with 68 cents for 40 miles. The railroad conceded there were no transportation conditions which justified a different level of rates intrastate in Wisconsin and interstate between Illinois and Wisconsin.

The defendant asked the Wisconsin commission for authority to reduce its intrastate rates on sand, gravel and crushed stone so as to permit it to compete with steam roads on the rates prescribed by the Wisconsin commission for application on such railroads. The electric road, however, did not reduce its interstate rates, which Examiner Wagner proposes should be held unreasonable.

Wisconsin Ruling on Gravel-Pit Taxation

THE Wisconsin Tax Commission on March 18 ruled as to taxation of gravel pits.

"Where one operates a gravel pit or other industry of like nature, all the buildings and machinery placed on the land without any present intention of removing them, whether in fee or leased, constitute fixtures and are part of the real estate. This includes fixtures actually affixed to the land, and those of sufficient weight to hold themselves in place, and heavy machinery attached to a building by wires, weights or pulleys."

Charges an Indiana Limestone Combine

SUIT was filed on March 24 in the Superior Court, Indianapolis, by Attorney-General U. S. Lesh, charging the existence in Indiana of an unlawful combination of companies controlling the quarrying and sale of Indiana limestone. The suit asks for a permanent injunction preventing a continuance of the alleged "combination and conspiracy" that the corporate charters and franchises of the accused companies be revoked, and for the appointment of receivers to wind up their affairs. Nineteen defendants, one of which is the alleged organization to which the quarries and selling agencies belong, are named in the suit.

Increasing Use of Freight Cars and Trucks

THERE were 12,141 more freight cars in operation on February 23 than on January 15, showing that in 13 days there was a distinct improvement in the movement of goods. In these two months there has been a decrease in idle freight cars of more than 200,000. No other figures indicate more clearly the swing of the business pendulum, unless it be the increasing number of motor trucks in use.

Accident Prevention

Cement as a Fire Extinguisher

UTILIZING the idea that concrete construction is fire-safe, says *Safety Engineering* for March, the Seneca, Kan., fire department applied cement to putting out a fire in a lumber yard, where there was no special fire equipment and no water system.

Cement was scattered over the lumber piles and then wetted down by a bucket brigade. On the piles already afire, thinly mixed cement was thrown. The chief said: "I attribute the saving of about a third of this lumber to the use of cement. It caked over the fire, smothering it and shutting out the air so that combustion could not take place. We could have made an even more effective use of the cement had we some means of forcibly throwing the liquid cement on the fire."

Several sacks of cement thrown into a 400-gal. of burning oil sufficed to eliminate any further danger.

Human Waste

SOME startling figures have been given out on present-day human wastes in industry by the Committee on Elimination of Waste in Industry of the American Engineering Council appointed by Herbert Hoover. A recent statement shows a total loss among 42,000,000 workers of 428,000 lives during 1920, and a probable loss of a half million in 1921. C. E. Knoepple, an engineer, asserted before a meeting of the Taylor Society that 811,000 years of lives were lost during the year 1921 by the workers of the United States in industrial accidents.

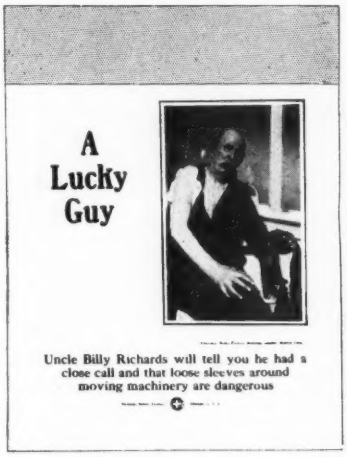
Accident Rates for Mineral Industries

THE safest branch of the varied mineral industries in which to work would appear to be the sandstone and blue-stone quarries, according to data of the comparative accident rates for all divisions of these industries compiled by the U. S. Bureau of Mines for 1920. The lowest fatality rate was found to be for this class of quarries, which employ a relatively small number of men and in which all work is done in daylight, free from many dangers that are inherent in underground mining. For the same year the highest fatality rate was that for metal mines. The highest injury rate was that for the lead and zinc mines of the Mississippi Valley, while the lowest was that for marble quarries.

Since the enactment of compensation laws by nearly all of the States, increased importance attaches to the accuracy and completeness of the statistical publications on industrial accidents. It is highly advisable therefore that full and accurate data concerning accidents be reported promptly by operators, not only to aid in the study and prevention of such accidents, but also to assist state compensation commissions and other insurance bodies in establishing premium rates that will be fair and equitable.

As the practical usefulness of statistical reports are increased or diminished by the promptness or tardiness with which the figures are published, the Bureau of Mines hopes that its annual inquiries relating to accidents may be filled out by all operators and returned promptly, in order that the value of the reports of the bureau on this subject may not be diminished by any unnecessary delay in their publication.

36 New Safety Bulletins Each Month



Uncle Billy Richards will tell you he had a close call and that loose sleeves around moving machinery are dangerous

Will Make Your Shop Bulletin Board As Interesting As a Newspaper

OUR SAFETY BULLETINS attract the workers' attention, and hold their interest. No highbrow stuff—they don't shoot over the heads of the workmen! Simple, yet full of human interest, they put the safety message across in a way that sticks! Results? They have helped many of the Council's members to reduce accidents 75 per cent or more because they instruct, they stimulate safety thinking, and they develop the safety habit among the men.

Members of the National Safety Council receive 36 different safety posters each month—extra copies as desired. A new bulletin every day! All posters attractively printed in two colors. Sizes 9x12 and 17x23 in.

SAFETY BULLETINS comprise only one item of the service you will secure through membership in the National Safety Council—a non-profit, co-operative association of 3500 employers helping each other to reduce the cost of accidents to their workers.

Write for sample safety bulletins today —post them on your bulletin boards and watch the results.

National Safety Council
Dept. R-1
Co-operative Not-for-Profit
168 North Michigan Avenue, Chicago, Ill.

What About Your Belts?

WHILE laws in most states are quite specific in requiring that belts in manufacturing plants be protected, the law does not go to the extent of solving the safety man's problems in this direction, says the National Safety Council's magazine. The law expects the employe to be protected against the belt, but it rests with the safety man to meet the requirement of the law. To protect a low over-head belt without building a veritable house around it is often quite a problem. To build a guard so as to permit easy access to the belt is another question demanding more than casual thought.

The National Safety Council will be glad to help you solve your belt guarding problems. Information on many different types of guards under varying conditions is included in the library and information service of the council. Photographs showing different types of guards are yours if you want them. A member of the council has also drawn up a complete set of specifications relating to care of the belts themselves. These specifications are yours for the asking.

Another Foolhardy One

EVEN with his eight years' experience in a cement plant, this workman tried to throw in a Griffin mill while he had a sack in his hand. The sack caught and drew his hand into the shaft. Result: a dislocated right shoulder, fracture of both bones in the forearm and of the humerus. He went through 110 days of suffering and loss of time.

Goggles Would Have Saved Him

THIS man had a wife and two children dependent upon him. He had been a cement plant employe for two years. One day he was pouring babbitt on a bearing and the babbitt exploded, burning his face and eyes severely. He disobeyed the injunction to wear goggles—and paid for his disobedience.

Editorial Comment

Toward Greater Prosperity

Prosperity among producers of cement, gravel, stone, gypsum, slate and other rock products depends pretty closely on conditions in the various construction industries. A large part and in some cases the entire output of these products is used in one form or another of construction, and lack of construction means an idle plant for the rock products producer. The producer, therefore, is vitally interested at all times in the stimulation and maintenance of construction, and especially now when costs of construction still have a retarding effect on building.

Of the two main elements of construction costs, materials and labor, the producer in these industries referred to has already done much in lowering material costs to a reasonable figure, yet he still finds his markets are below the capacity of his plant because the cost of labor in the building trades, still excessive in many cases, is discouraging the fullest possible amount of construction.

What can materials producers do to bring down excessive labor costs, and root out graft and corruption in the building trades so that confidence is restored to the prospective builder with the result that he is induced by the reasonable prices to proceed with his building? Just this—they can follow the suggestion of Dean Cooley, president of the Federated American Engineering Societies, made at the National Construction Conference in Chicago this week.

Dean Cooley suggested that what is most needed is a campaign of education, with the ultimate aim of reducing labor costs. As a matter of fact, and not of argument, the public generally and labor in the construction trades in particular need to be shown that from 75 to 90 per cent of the cost of all materials is labor; that excessive labor costs due to high wages and restricted output mean high costs in every element of construction expense, with the result that less work is available. Labor needs to be shown that greater individual effort is to their advantage, for by reducing costs through larger output more and steadier work is possible.

Producers can take up this suggestion and do their part in spreading this gospel. Show first how practically the entire cost of most products is made up of labor costs—the cost of quarrying, handling, and preparing the material; equipment costs, which again go back to the cost of producing and fabricating the raw material; transportation costs, which are largely made up of labor costs in constructing and maintaining the roadbed, operating the road; and so on. Then point out how, when costs are excessive, prospective users of materials are driven into some other field of endeavor until costs at that point have become reasonable again. High labor costs in the materials industries means high material costs, less demand for materials, and more idle days for the workman who insists on high pay and low production.

This educational campaign is particularly needed just now in many parts of the country among members of the building trades. If labor costs in construction will drop, building will be greatly stimulated even over the present increasing figures. The natural result will be a greater demand for the rock products needed in every kind of construction, and increasing output and prosperity among those industries.

A Way to Overcome Membership Difficulties

Secretaries of trade associations seem to be finding some difficulty in securing and holding members in their associations. The situation is not surprising. When there is little business the average association member or prospective member will be likely to conclude that there's not much use for the association, and since he's cutting expense wherever he can, the association dues are an easy item to strike out.

This attitude is probably wrong; the average member is likely to need the association more when business is dull than when business is good. Certainly this is true where well-conducted associations are involved.

But the situation exists, nevertheless. How to overcome it? One way in associations of the construction industries is to reduce construction costs, as suggested above, and with the resulting increase in construction this problem of building up and maintaining membership will practically disappear from the secretary's list of worries. Let the secretary join the campaign for education proposed above.

Advertising and Selling

On this page in the last issue were given two examples of far-reaching publicity methods of large organizations with a suggestion of the principle which the smaller producer might learn from these examples. Principles for advertising and selling are always of vital interest to the man with something to sell, and the article "Selling More to the Farmers" on another page of this issue is filled with principles to help producers of all kinds of materials. The principles are given in terms of concrete suggestions for the small agricultural limestone producer, which makes the article particularly helpful to this class of producers, without in the least detracting from its value as a help to all producers in analyzing their problems and planning their efforts along advertising and selling lines.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.25	1.25	1.25	
Buffalo, N. Y.	1.50 per net ton all sizes—Winter prices from stock					
Burlington, Vt.	1.00		2.50	2.00	2.00	
Chaumont, N. Y.	1.00		1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	
Coldwater, N. Y.	1.50 per net ton all sizes; fluxing stone 1.80 per ton					
Eastern Penna.	1.00	1.50	1.50	1.50	1.50	1.50
Munns, N. Y.	1.00	1.25	1.25	1.25	1.25	1.25
Western New York	1.00	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alden, Ia.	.80@1.00	.80@1.00	1.50	1.45		
Alton, Ill.	2.00		1.50	1.35	1.35	
Buffalo, Iowa	1.00		1.15	.95	1.05	1.05
Chicago, Ill.	1.20	1.60	1.20	1.20	1.20	1.20
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Greencastle, Ind.	1.00	1.15	1.05	1.00	1.00	1.00
Illinois, Southern	1.75	1.60	1.50	1.50	1.40	
Kansas City, Mo.	.60	1.60	1.60	1.60	1.60	1.60
Kokomo, Ind.	1.10	1.25	1.25	1.10	1.10	1.10
Krause or Columbia, Ill.	1.35	1.20	1.20	1.10	1.10	1.10
Lannon, Wis.	.90	1.00	1.00	1.00	1.00	1.00
Marblehead and Brillion, Wis.	1.10		1.20	1.10	1.10	
Montreal, Canada	.85	1.20	1.10	1.05	1.00	
Montrose, Ia.		1.50	1.60	1.55	1.50	
River Rouge, Mich.	1.15	1.15	1.15	1.15	1.15	1.10
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.00	
Southern Illinois	1.35	1.35	1.35	1.25	1.25	
Stolle, Ill. (I. C. R. R.)	1.30		1.25	1.35		
Stone City, Iowa	.75		1.40	1.30	1.25	
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
	Prices include 90c freight					
Valmeyer, Ill.	1.60	1.30	1.30	1.30	1.30	1.30
Waukesha, Wis.	all sizes 1.10 per ton					
SOUTHERN:						
Alderson, W. Va.	1.10	1.35	1.65	1.35	1.35	
Bromide, Okla.	1.50			1.50	1.50	
Cartersville, Ga.		2.00	2.00	1.40	1.40	1.40
Chickamauga, Tenn.	.90	1.00	1.00	1.00	.90	
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
Ft. Springs, W. Va.	1.00	1.35	1.60	1.35	1.35	
El Paso, Tex	1.00	1.00	1.00	1.00	1.00	
Gainesville, Ga.	1.00	1.25	1.25	1.25	1.25	1.25
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	
Ladds, Ga.	2.00	2.00	2.00	1.50	1.50	1.50
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
Portland, Ga.	.60@1.00		(All other sizes 1.00@1.25)			
Shephard, Tenn.	1.00@1.25	1.00@1.25	1.00@1.25	.75@1.00	.75@1.00	
WESTERN:						
Atchison, Kans.	50	2.10	2.10	2.10	2.10	2.10
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50		1.50	1.50	1.25	
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2 20	2.00	1.80	1.50	
Branford, Conn.	.60	1.50	1.25	1.15	1.00	
Bound Brook, N. J.	1.80	2.30	1.90	1.60	1.40	
Dresser Jct., Wis.	1.00	2.25	2.25	2.00	1.65	1.50
Duluth, Minn.	.90@1.00	2.25	1.90@2.00	1.40@1.50	1.30@1.40	1.30@1.40
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	
Eastern Mass.	.60	1.85	1.60	1.50	1.50	1.50
Eastern New York	.80	1.60	1.60	1.50	1.40	1.40
Eastern Penna.	1.00	1.85	1.75	1.55	1.45	1.45
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	60@ .80	1.60@1.75	1 50	1.25	1 10	
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*		1.75*	1.50*	1.50*	
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Springfield, N. J.	1.80	2.00	1.85	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Alexandria Bay, N. Y.	1.60		1.30	1.50	1.20	
Bell Rapids, S. D.—Granite	.75	1.85	1.75	1.70	1.70	
Dundas, Ont.—Flint	1.00	1.80	1.50	1.50	1.25	1.20
Eastern Penna.—Sandstone	.85	1.55	1.55	1.40	1.40	1.40
Eastern Penna.—Quartzite	.90	1.20	1.20	1.20	1.20	1.20
Holton, Ga.—Granite	.40		2.50	2.25	2.25	2.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30		1.20	
Los Angeles, Cal.—Granite		1.25@1.50	1.15@1.40	1.15@1.40		
Macon, Ga.—Granite	.50		2.50	2.25	2.00	1.25@1.90
Middlebrook, Mo.—Granite	3.00@3.75		2.00@2.40	2.00@2.65		1.50@1.85
Red Granite, Wis.	1.35	1.40	1.30	1.50	1.20	
Sioux Falls, S. D.—Granite	.75	1.85	1.75	1.70	1.70	
Stockbridge, Ga.—Granite	.50	2 00	1.90	1.75	1.75	
Utley, Wis.—Red Granite	1.35	1.40	1.30		1.20	

*Cubic yard. †Agrl. lime. ‖R. R. ballast. ‡Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk 2.50

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—75% thru 100 mesh; 85% thru 50 mesh; sacks, 4.50; bulk..... 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; sacks, 4.00; bulk 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Osborne, Pa.—45% thru 200 mesh, 60% 100 mesh, 100% thru 20 mesh; 4.50 sacks; bulk 3.00

Texas, Md.—Analysis, 58.02% $CaCO_3$, 37.3% $MgCO_3$—50% thru 50 mesh; bags, 4.25; bulk 2.50

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 5.00—cloth, 5.25; bulk.. 3.50

Williamsport, Pa. — Analysis, 88-90% $CaCO_3$, 2-4% $MgCO_3$—50% thru 50 mesh; paper, 4.75; bulk..... 3.75

CENTRAL:

Alton, Ill. — Analysis, 98% $CaCO_3$, 0.3% $MgCO_3$—90% thru 100 mesh.... 4.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh ..... 1.60@2.00

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.25

Bettendorf, Ia., and Moline, Ill.—50% thru 100 mesh, 50% thru 4 mesh.... 1.65

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$ (90% thru 50 mesh, 2.00), 50% thru 4 mesh..... 1.50

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Kansas City, Mo.—50% thru 100 mesh 1.60

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.35

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$—50% thru 60 mesh, 90% thru 70 mesh; bags, 4.50; bulk 3.00

Milltown, Ind. — Analysis, 93.10% $CaCO_3$, 3.20% $MgCO_3$—33.6% thru 100 mesh, 40% thru 50 mesh..... 1.35@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$ — 60% thru 100 mesh, all thru 10 mesh..... 1.25

Montrose, Ia.—50% thru 100 mesh..... 1.35

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50

Piqua, O.—100% thru 10; 90% thru 50; 70% thru 100..... 3.25@5.00

99% thru 10; 55% thru 50; 40% thru 100 ..... 1.75@2.00

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 30 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh 1.50
Waukesha, Wis.—No. 1 kiln dried..... 2.00
No. 2 Natural..... 1.75
Whitehill, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh 5.00
90% thru 50 mesh..... 1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25

SOUTHERN:

Alderson, W. Va.—90% thru 50 mesh 1.50
Barber, Va.—Analysis, 92 to 98% $CaCO_3$—Bags, 6.50; bulk..... 4.50
Blowers, Fla.—Analysis, 98% combined carbonates—75% thru 200 mesh..... 4.75
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$—50% thru 100 mesh 2.00
90% thru 4 mesh..... 1.50
Cartersville, Ga.—Analysis, all thru 10 mesh ..... 1.75@2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh..... 2.75
Ft. Springs, W. Va.—50% thru 100 mesh 3.00
Hot Springs, N. C.—Agricultural limestone; sacks, 4.25; bulk..... 3.00
Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh..... 2.00
90% thru 50 mesh..... 1.50
Ladds, Ga.—90% thru 50 mesh..... 2.00
Linnville Falls, N. C.—Analysis,, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; sacks, 4.50; bulk..... 3.00
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks 5.00

WESTERN:

Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk 4.00
Garnett, Okla.—Analysis, 86% $CaCO_3$, 50% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 1.80
Terminous, Calif.—Analysis, 97.3% $CaCO_3$, .04% $MgCO_3$—65% thru 200 mesh, 90% thru 100 mesh, 95% thru 80 mesh, 100% thru 50 mesh; sacks, 5.00; bulk 4.50
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Baltimore, Md. ..... 2.25@2.75
Berkley Springs, W. Va..... 1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry..... 2.25
Cheshire, Mass. ..... 5.00@7.00
Hancock, Md.—Damp ..... 2.50@3.50
Klondike and Pacific, Mo..... 2.00@2.50
Mapleton, Pa. ..... 2.25@2.50
Massillon, Ohio 3.00
Millington, Ill. 1.75
Mineral Ridge, O.—Dry..... 2.50
Green 2.25
Montoursville, Pa.—Green, washed..... 2.00
Oregon, Ill.—Glass sand..... .75
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. 2.75
Round Top, Md.—(washed-screened).... 1.25
St. Mary's Pa.—Unwashed..... 2.00
Thayers, Pa. 2.50
Utica, Ill. ..... 1.25@1.75
Zanesville, Ohio ..... 2.00@2.50

FOUNDRY SAND:

Albany, N. Y.—Sand blast..... 4.00
Molding fine, coarse and brass..... 2.25@2.50
Allentown, Pa.—Core and molding fine 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40
Beach City, O.—Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, O.—Core ..... .30@1.25
Sand blast ..... 4.50@5.00
Furnace Lining 2.00
Molding fine ..... 2.00@2.75
Molding coarse ..... 1.75@2.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge and So. Heights, Pa.	.....	1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95	.85	.85	.85	.85
Erie, Pa.	1.00	.....	1.00	.....	1.25	.....
Farmingdale, N. J.	.48	.48	1.30	1.30	1.20	.....
Hartford, Conn.	.90	.....	1.25	1.15	1.15	.....
Leeds Junction, Me.	.....	.50	1.75	1.50	1.35	1.25
Ludlow, Mass.	.75*	.75*	1.70	.....	1.50*	1.50*
Philadelphia, Pa.	.75	.75	.....	1.40	1.25	.....
Pittsburgh, Pa.	1.15	1.15	1.15	1.15	.70	.70
Portland, Maine	.....	.50	1.75	.....	1.35	1.35
Texas, Md.	.....	1.00	.....	Pure white sand, 1.50		
Washington, D. C.	.60@ .75	.60@ .75	1.60@2.00	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.	.....	.85	.....	.....	.....	.....
Anson, Wis.	.40	.40	.....	.....	.....	.90
Attica and Covington, Ind.	.90	.90	.90	1.00	1.00	1.00
Barton, Wis.	.....	.60	.70	.70	.70	.70
Beloit, Wis.	.....	.50	.....	.....	.50	.....
Chicago, Ill.	.....	1.75@2.23	1.75@2.43	.....	.....	.....
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.....	.75@1.00	.75@1.00	.75@1.00	.75@1.00	.75@1.00
Des Moines, Ia.	.50	.40	1.50	1.50	1.50	1.50
Detroit, Mich.	.95	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.40	.....	1.25	.....	.90	.....
Elkhart Lake, Wis.	.70	.58	.90	.90	.72	.72
Ft. Dodge, Ia.	.....	1.22	.....	2.17	.....	.....
Grand Rapids, Mich.	.....	.50	.....	.85	.75	.75
Greenville, Mechanicsburg, O.	.60	.50	.50	.50	.60	.60
Hamilton, Ohio	.90	.90	.....	.....	.90	.....
Hawarden, Ia.	.....	.50	.....	.....	1.60	.....
Hersey, Mich.	.50	.50	.....	.....	.80	.70
Indianapolis, Ind.	.60	.60	.....	1.50	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Le Mars, and Doon, Ia.	.....	.90	.....	1.80	.....	.....
Libertyville, Ill.	.....	.70	.....	.70	.70	.....
Mankato, Minn.	.50	.40	.75@1.25	.75@1.25	.75@1.25	.75@1.25
Mason City, Ia.	.65	.55	1.55	1.60	1.60	1.55
Milwaukee, Wis.	1.15	1.15	1.25	1.25	1.25	1.25
Minneapolis, Minn.	.35	.35	1.50	1.25	1.25	1.25
Moline, Ill.	.60@1.00	.60@1.00	1.60	1.60	1.60	1.60
Riton, Wis.	.....	.60	.....	.70	.70	.70
St. Louis, Mo., f. o. b. cars	1.10	1.35	1.50	1.30	.....	1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15	.....	2.10
Summit Grove, Clinton, Ind.	.60@ .65	.60@ .65	.60@ .65	.60@ .65	.60@ .65	.60@ .65
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.60	All other sizes, .70 per ton				
Winona, Minn.	.50	.50	1.50	1.25	1.25	1.25
SOUTHERN:						
Alexandria, La.	.60@ .80	.50@ .75	.....	.....	.85@1.50	1.20@1.50
Birmingham, Ala.	1.48	all gravel—1.88				
Charleston, W. Va.		(Sand, 1.40@2.50; gravel, 1.50@2.75)				
Estelle Springs, Tenn.	1.15	1.00	1.00	1.00	.85	.65
Ft. Worth, Tex.	.....	2.00	.....	2.00	.....	2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	1.00@1.15	1.00@1.15	.....	2.12	1.92	1.74
Lake Weir, Fla.	.....	.75	.....	.....	.....	.....
Macon, Ga.	.....	.50@ .75	.....	.....	.....	.....
Memphis, Tenn.	1.12	1.12	.....	.....	.....	1.95
N. Martinsville, W. Va.	.....	1.00	.....	1.20	.....	.80
New Orleans, La.	.....	.50	.....	.....	1.00	.....
Pine Bluff, Ark.	1.25	.80	Washed gravel, all sizes, 1.75			
Roseland, La.	.25	.....	.85	.....	.....	.....
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Jedburg, Mo.	.70	1.20	.95	.75	.75	.70
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Los Angeles, Calif.	.....	.75	1.25	1.25	1.15	1.15
Niles, Calif.	1.00	1.00	1.40	1.00	1.00	1.00
Pueblo, Colo.	1.10*	.90*	.....	.....	1.50*	.....
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40
San Francisco, Calif.	.....	1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.50*	1.50*	2.00*	1.50*	.....	1.50*
Yutan, Neb.	.40	Bank run .40				

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.75	.75	.75	.75	.75	.75
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Cape Girardeau, Mo.	River sand, 1.00 per yd.					
Cherokee, Ia.	.80 per ton—1.20 washed					
Dudley, Ky. (Crushed Sand)	.....	1.05	.....	1.00	.....	.....
East Hartford, Conn.	.65 per cu. yd.					
Elkhart Lake, Wis.	Washed gravel .66					
Estelle Springs, Tenn.	.....	.....	.....	.....	.....	.85
Fishers, N. Y.	.50@ .65	.....	.....	.50@ .65	.....	.50
Hamilton, O.	.40 per cu. yd. in pit					
Hartford, Conn.	.....	1.00*	.....	.....	.....	.....
Hersey, Mich.	.30	.....	.....	.50	.50	.....
Indianapolis, Ind.	Mixed gravel for concrete work, .65					
Lindsay, Tex.	1.45	.....	.....	.....	.60	.....
Janesville, Wis.	.....	.65	.....	.....	.65@ .75	.....
Oxford, Mich.	.....	.....	.....	.65	.65	.....
Pine Bluff, Ark.	Road gravel .50					
Rochester, N. Y.	.60@ .75	.60@ .75	.....	.....	.50@ .65	.50@ .65
Roseland, La.	.....	.25	.....	.....	.....	.....
Saginaw, Mich., f. o. b. cars	.....	.75	1.30	1.30	1.30	1.30
St. Louis, Mo.	60% gravel, 40% sand, 1.40					
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas	.....	80	.....	1.50	.....	1.40
Winona, Minn.	.....	.....	.70	.70	.70	.70
York, Pa.	.....	.95@1.20		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. ‖ Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.25	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.80	1.25	.90	.90	.90	.90
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, O.	2.05	Other grades 1.45					
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	(Any delivery in city except team track deliveries) 1.25	1.50	1.25	1.25	1.25	1.25
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.60	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN:								
Adams, Mass.			7.00					3.50
Bellefonte, Pa.			8.00	9.00	8.00		7.50	
Berkley, R. I.			14.00					2.50
Buffalo, N. Y.		11.00	11.00	11.00			9.50	2.00•
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
Paxtang and LeMoyne, Pa.					5.00		4.75@5.00	
Union Bridge, Md.			13.00		5.50			
West Rutland, Vt.	13.50	12.25	7.50@12.25	14.00			11.00	3.50
West Stockbridge, Mass.			15.00					
Williams and Blue Bell, Pa.			11.25				8.00	1.70•
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		9.50	9.50@10.50	9.50@10.50			7.00	
CENTRAL:								
Delaware, Ohio	10.50	9.00	8.50	9.50			8.00	1.40
Geneo, Ohio	10.50§							
Gibsonburg, Ohio	10.50§	8.50	8.50		7.25	9.25		
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70•
Knowles and Valders, Wis.			12.50		5.00	9.00		
Luckey, Ohio	10.50	9.00	7.25					
Marblehead, Ohio		9.00	8.50				8.00	1.50•
Mitchell, Ind.		11.00	11.00	11.00	9.50		8.50	1.45
Sheboygan, Wis.					5.50	8.50		
White Rock, Ohio	10.50				7.25	9.25		
Woodville, O. (dlrs.' price)	10.50a	9.00a	7.25a	10.00a	7.25		8.00	1.50
SOUTHERN:								
El Paso, Tex.							12.50	
Karo, Va.							7.00	1.30
Knoxville, Tenn.		9.50@11.00	9.50@11.00				7.50	1.30
Ocala and Zuber, Fla.	12.00	12.00					10.00	1.50
Sherwood, Tenn	11.00	9.50			7.50		7.50	
Staunton, Va.					8.00		9.50b	1.60
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. Mex.					12.50	15.00		
San Francisco, Calif.	22.00	21.00	15.00	22.00			16.00	2.15•

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl.

Miscellaneous Sands

(Continued from preceding page)

Stone sawing	1.50
Traction	1.00
Brass molding	2.75
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass Molding	2.15
Dresden, O.—Molding coarse	1.50@1.75
Brass molding	1.75
Dunbar, Pa.—Traction, damp	2.00
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Falls Creek, Pa.—Glass sand	2.50
Furnace lining, traction and molding coarse and fine, and core	2.00
Sand blast	3.50
Eau Claire, Wis.—Core	.75@1.25
Sand blast	3.25@4.25
Traction sand	.50
Franklin, Pa., and Utica, Pa.—Traction	1.75@2.00
Core	1.25@2.00
Molding coarse	2.00
Furnace lining	2.50
Greenville, Ill.—Molding coarse	1.40@1.60
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and looting clay	.75@1.25
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and fine, stone sawing (pit run)	1.75
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.25
Mapleton, Pa.—Glass sand, core, furnace lining, molding fine and coarse; dry, 2.50; damp	2.00
Massillon, O.—Traction, molding fine and coarse, furnace lining	2.25
Michigan City, Ind.—Core, traction	.30@ .40
Mineral Ridge, Ohio—Core, furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction (green)	2.00
Montoursville, Pa.—Core	1.25@1.40
Traction	1.00@1.25
Brass molding	1.50
New Lexington, O.—Molding fine	2.75
Molding coarse	2.50
Oregon, Ill.—Core, furnace lining, molding fine and coarse, traction	.75
Brass molding	.75
Sand blast	3.00
Ottawa, Ill.—Core, molding coarse (crude silica sand)	.75@1.00
Ottawa, Minn.—Core	1.00@1.50
Glass, molding coarse, stone sawing (all crude silica)	1.00@1.50
Pelzer, S. C.—Glass sand (carload lots only)	.70

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core, damp	2.50
Roofing	2.75
Sand blast	3.75
Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal.—Glass and roofing	3.00@3.50
Core, molding fine and brass	2.30@2.60
Furnace lining and molding coarse	3.60@4.25
Coarse core sand	3.60@4.25
Sand blast	3.75
Stone sawing and traction	2.30
Thayer, Pa.—Traction & stone sawing	2.00
Furnace lining, m'ld'g fine and coarse	1.25
Core	2.00
Utica, Ill.—Core	.85@1.10
Furnace lining	.85
Molding fine and coarse	.60@ .65
Roofing sand	1.25
Sand blast	2.25@3.00
Stone sawing	.85
Traction and brass molding	1.25
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.75) dry	2.00
Traction (dry)	2.00
Zanesville, O.—Core, furnace lining	2.25
Molding fine, traction, brass molding	*2.00
Molding coarse	*1.75

*Plus 75c per ton.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude Talc	3.50
Ground talc (20-50 mesh), bags	10.00
Cubes	50.00
Blanks, per lb.	.07
Chatsworth, Ga.—Crude talc	8.00@10.00
Ground talc (150-200 mesh), bags	12.50
Pencils and steel workers' crayons, per gross	1.50@ 2.00
Chester, Vt.—Ground talc (150-200 mesh), including bags	8.50@10.00
Emeryville, N. Y.—200-300 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200-mesh	16.00@30.00
(Bags extra)	
Ground Talc (50-300 mesh)	13.50@15.50
Gordonsburg, Tenn.—B.P.L. 68%@72% 200 mesh)	4.50@6.00 13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@3.50
Ground talc (20-50 mesh), bags, 7.75; (150-200 mesh) bags	8.00@10.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50 (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 Mesh)	20.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	9.00@16.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	8.50
(Bags $1.00 extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68%@72%	4.50@6.00
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	7.00
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho.—2,000 lb. mine run, B.P.L. 70%	4.00
Wales, Tenn.—B.P.L. 70%	7.25@7.75
Per 2000-lb Ton	
Barton, Fla.—Analysis, 50% to 65% B.P.L.	4.00@6.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50

(Continued from preceding page)

Ground Rock

Centerville, Tenn.—B.P.L. 65%	6.00@6.50
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72%	5.50
B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 65@70%	5.00@6.00

Florida Soft Phosphate

Raw Land Pebble

Per Ton	
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton	
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	6.00@ 7.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	$18.00@20.00	9.00@14.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, grey, in bags		30.00
Middlebrook, Mo.—Red granite; sacks	30.00@32.50	20.00@25.00
Milwaukee, Wis.		20.00@26.50
Phillipsb'g, N. J.—Green stucco dash		9.00@14.00
Piqua, O.—Marble	8.00@10.00	7.00@ 9.00
Poultney, Vt. — Roofing granules		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	7.00@12.00	12.00
Wausau, Wis.	14.00@18.00	

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	18.00	25.00@35.00
Bellows Falls, Vt.	20.00	25.00
Birmingham, Ala.	13.50	27.50@45.00
Bridgeport, Conn.	31.00	32.00
Carpenterville, N. J.	16.00	35.00@65.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	22.50@25.00	35.00@75.00
Rochester, N. Y.	21.00	
Friesland, Wis.	20.00	
Houston, Tex.		19.50
Omaha, Nebr.	19.00	28.00@40.00
Piqua, O.	15.00	20.00@25.00
Phoenix, Ariz.	16.00	35.00@80.00
Portland, Ore.	21.00	30.00@75.00
Puyallup, Wash.	22.00	50.00@75.00
Rapid City, S. D.	18.00	30.00@45.00
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00@30.00	35.00@75.00
Salt Lake City, Utah	16.00	35.00@40.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	20.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	13.00@14.00	30.00@42.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	8.50
Boston, Mass.	11.50@12.50
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	12.00
Gary, Ind.	11.50@12.00
Grand Rapids, Mich.	12.00
Michigan City, Ind.	10.00
Milwaukee, Wis.	12.00@13.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
F. o. b. cars	13.00
Washington, D. C.	13.50
Winnipeg, Can.	14.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	
	Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net)	
	Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Ia.	2.21
Cincinnati, Ohio	2.35
Cleveland, Ohio	2.26
Chicago, Ill.	1.97
Dallas, Tex.	2.25
Davenport, Ia.	2.16
Denver, Colo.	2.59
Detroit, Mich.	2.17
Duluth, Minn.	1.94
Indianapolis, Ind.	2.21
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.00@3.20
Milwaukee, Wis.	2.18
Minneapolis, Minn.	2.24
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.88
New York, N. Y. (includes bags)	2.35
(10c per bbl. discount in 10 days)	
Pittsburgh, Pa.	2.02
Portland, Ore. (sacks 10c ea.)	3.05
St. Louis, Mo.	2.10
San Francisco, Calif. (sacks 10c ea.)	2.73
St. Paul, Minn.	2.24
Toledo, Ohio	2.20
Seattle, Wash.	2.94
F. o. b. Seattle (including sacks)	3.50

NOTE—Add 40c per bbl. for bags.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x36" Weight 1500 lbs. Per M Sq. Ft.	⅜x32x36" Weight 1850 lbs. Per M Sq. Ft.	Wallboard, ⅜x32 or 48", Lengths 6'-10', 1850 lbs. Per M Sq. Ft.
Alabaster, Mich.	3.00	4.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Blue Rapids, Kan.	3.00	4.00	6.00	8.00	10.00	10.50	10.00	.....	23.75	19.00	19.375	20.00	26.75
Douglas, Ariz.	.....	.....	6.00	13.00	.....	10.50@12.00	.....	.....	.....	11.50@13.50	.....	.....	.....
Eldorado, Okla.	.....	.....	.....	.....	10.00	10.50	10.00	.....	15.00	.....	27.50	29.30	39.55
Fort Dodge, Ia.	3.00	3.50	6.00	8.00@11.00	10.00	10.50	15.45@22.00	.....	21.30	20.00	19.375	20.00	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3.00	4.00	6.00	8.00	10.00	10.00	18.50	.....	27.25	20.00	19.375	20.00	30.00
Gypsum, Ohio	3.00	4.00	6.00	9.00	10.00	10.00	19.25	7.50	27.95	21.00	19.375	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	.....	10.00	10.50	.....	.....	.....	11.00	.....	.....	.....
Loveland, Colo.	3.00	4.00	6.00	8.00	10.00	10.50	.....	.....	29.80	.....	.....	.....	40.00
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	31.25	21.00	19.375	20.00	30.00
Piedmont, S. D.	.....	.....	6.00	8.00	10.00	10.50	.....	.....	32.25	.....	27.97	31.04	41.18
Plasterco, Va.	4.00	.....	7.00	8.00	10.00	10.00	20.90	.....	29.90	19.00	21.375	22.00	30.00
Southard, Okla.	3.00	4.00	6.00	8.00	10.00	10.50	10.00	.....	15.00	.....	26.20	28.70	30.00
Winnipeg, Man.	5.50	5.50	7.00	15.00	15.00	15.00	.....	.....	.....	.....	28.50	30.00	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond Plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

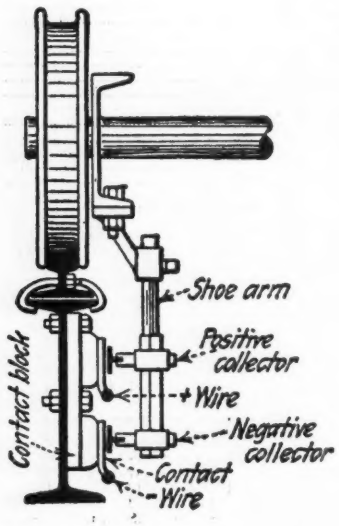
New Machinery and Equipment

Traveling Crane With Surface-Contact Collector

AN electric surface-contact system for operating overhead traveling cranes, thus giving protected live spots instead of a bare trolley wire or third-rail conductor, is being introduced by the Simplex Surface Contact System, Williamsport, Pa. In a recent installation a collector shoe 11 ft. long is carried by the crane and slides over insulated copper-faced contact blocks spaced 10 ft. apart and attached to the web of the runway girder. Spring pressure exerted by the shoe presses on the cap of the block, making electric connection between the feed wire and the controller on the crane.

For the feed and return wire circuits the blocks are so made that the two insulator contact points are mounted on a single base which is bolted to the girder. The contacts are separately connected to their respective wires. The two shoes are also mounted on a single support.

These shoes are adjustable and are so constructed as to be easily bolted to the crane carriage. Only the face of the shoe

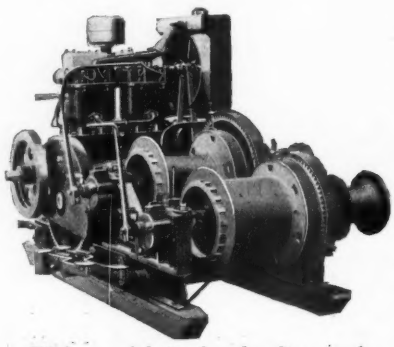


Details of surface-contact system

is alive as an insulating strip extends the entire length of the shoe and insulates the contact face from every other part. Copper contact of the fixed block has a surface of 2½ in. high and 1½ in. wide. The lower end is bent into a loop to support the feed wire, the insulation of which is removed at this point to permit the soldering of the wire to the copper strip.

High-Speed Hoist for Dragline

A NEW Novo DHG high-speed hoisting outfit designed for dragline work in gravel pits is announced by the Novo Engine Co., Lansing, Mich. Among its features is the high speed available by reason of the drum size, which has a diameter of 12 in. and pulls a bottomless scraper 200 ft. per min. The forward



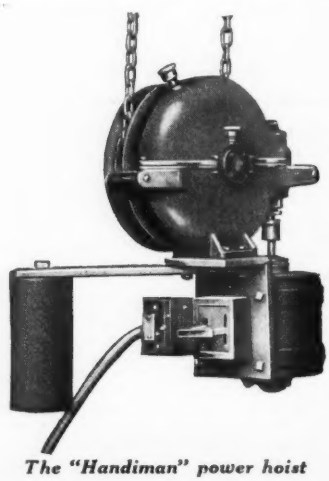
High-speed hoist for dragline work

drum is 16 in. in diameter and returns the scraper at 375 ft. per min.

The hoist is powered with the Novo four-cylinder engine, which is somewhat heavier than the truck or tractor type; is slower in speed and has heavier crankshafts and larger bearings. This engine is equipped with a sensitive built-in governor which maintains the speed regardless of the load. It is furnished with carburetor, magneto, fuel tank and cooling system.

New Electric Hoist

A NEW hoist electrically operated, is announced by the New Jersey Foundry and Machine Co., 90 West street, New York City. This machine, which may be suspended in the bight of the operating chain, has a capacity to overhaul 138 ft. of hand chain per minute and a chain pull of 130 lb. This gives a load lifting speed of approximately four times that obtainable by hand power and it can be operated by one man.

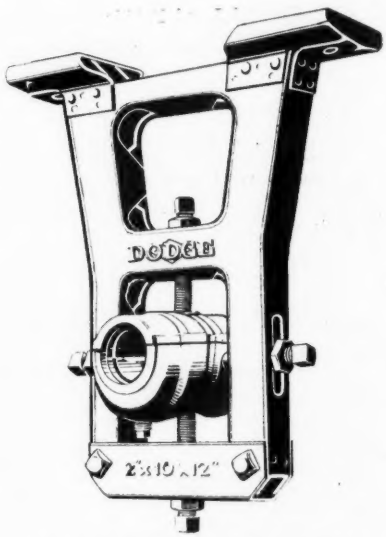


The "Handiman" power hoist

Current may be supplied by a flexible conductor from convenient sockets or suspended from the hoist if more desirable to bring the feeders to that point. The machine is said to balance itself, weighs about 160 lb. and is easily handled. The gears are hardened and run in oil. The machine can be furnished for operation on both alternating and direct current.

New Lineshaft Hanger

A NEW pressed steel lineshaft hanger, as shown in the accompanying illustration, has been put on the market by the Dodge Sales & Engineering Co., Mishawaka, Ind. This hanger, designed for general purpose use, is intended to meet the need for a lineshaft hanger of



Pressed steel lineshaft hanger for general use

lightness and strength to serve under conditions not severe or unusual and where first cost is of guiding importance. It is not believed that steel hangers are suitable for every purpose regardless of their construction, but this type seems to be quite practical under conditions which permit its use and where extreme vibration is not a factor.

News of All the Industry

Incorporations

Pollard **Sand and Gravel Co.**, Memphis, Tenn., has been incorporated at $100,000.

Weldon Spring Quarry Co., St. Charles, Mo., has been incorporated at $100,000.

Standard Sand and Gravel Co., Lillington, N. C., has been incorporated at $500,000.

New York Tidewater Gravel Corp., Dover, Del., has been incorporated at $3,250,000 to quarry stone, gravel, etc.

Kansas City National Slate Co., Kansas City, Mo., has been incorporated at $10,000. Marley and Reed, attorneys.

The Bond Marble Co. has been incorporated in Knoxville, Tenn., with a capital stock of $150,000, by C. M. Jones, M. W. Edgerton and E. C. Metcalfe.

The Bitter Lake Gravel and Concrete Co. has been incorporated in Seattle, Wash., with a capital of $20,000, by L. S. Meisted, R. T. Pamment and L. J. Wyckoff.

The Hurom Portland Cement Co., Detroit, Mich., has been incorporated at $2,000,000. President, J. B. Ford; secretary, S. T. Crapo. Western representative, Douglass Van Dyke, Milwaukee, Wis.

Green Bay Sand and Gravel Co., Green Bay, Wis., has been incorporated at $50,000 to operate sand and gravel pits and stone quarries and deal in the same by Harry Bond, Fred Hansen and Charles F. Kelly.

State Washed Sand and Gravel Co., Milwaukee, Wis., has been incorporated at $40,000 to operate sand and gravel pits; deal in sand and gravel. T. D. Francey, A. W. Dick and M. Larson are the incorporators.

The Sawyer Stone Co., Sturgeon Bay, Wis., has been incorporated at $250,000 by G. A. Huck, president; A. N. Wagener, vice-president; Lester Nebel, secretary; Ernest Wiegand, treasurer, and E. B. Olson, director.

The Granite Supply Co. has been incorporated in St. Cloud, Minn., with a capital of $100,000, by Olof Frick and Wm. Campbell; will engage in the quarrying and manufacturing of granite products.

The Pilot Knob Gravel Co. has been incorporated in Frankfort, Ky., with a capital of $250,000, by G. B. Williams, of Winchester, Va.; W. R. Foreman, Ashland, Ky.; and J. J. Melton, Richmond, Va.

Magnesite Products Co., Chicago, has been incorporated at $50,000. Incorporators: Adelor J. Petit, Jr., Frederick W. Snider, Edmund S. Cummings, to manufacture and deal in magnesite, cement, lime, stone, plaster, etc.

Milwaukee Cement Co., Milwaukee, Wis., has been incorporated at $50,000. There is at present a Milwaukee Cement Co., which is to change its name and dispose of a portion of its business. J. R. Barthelet, W. G. Barthelet, Adele Kortebein, incorporators.

Cement

The Harriman Cement and Stone Co., of Harriman, Tenn., has increased its capital stock from $6,000 to $60,000.

The Globe Portland Cement Co., of Minneapolis, Minn., has let the contract for a cement plant at Dubuque, Ia., to cost about $2,000,000.

The Interstate Concrete Co. has been incorporated in Charlotte, N. C., with a capital stock of $25,000, by W. Sinclair Stewart, A. R. Long and R. H. Long.

Seattle, Wash.—After an idleness of more than three months the Portland Cement Co. plant will resume operation, furnishing work for 150 men and providing a payroll of $20,000 monthly. The factory will work at full blast and the company hopes to run steadily until next fall.

New York City—The International Cement Corporation has obtained the contract for the cement in the New Hudson vehicular tube, estimated at approximately 200,000 bbl.; also the cement for harbor construction work in Havana Harbor, estimated at from 75,000 to 100,000 bbl. The corporation also has closed contracts for the materials for new road work.

Mason City, Iowa—The industrial outlook in Mason City became rosier when the Northwestern States Cement mills reopened after two months of idleness and 500 men returned to work. More are to be taken back within a week or two. The Lehigh company also announced that its plant would be reopened. This will restore wages to more than 1,000 families.

Limestone

The Georgia-Florida Fertilizer Co., with $200,000 capital, has been organized at Savannah, Georgia, by Walter F. McNeill and B. P. Seaman.

North Adams, Mass.—Damage estimated at between $4,000 and $5,000 was caused by fire in the plant of the Hoosac Valley Lime Co. The building containing the hydrating and pulverizing department was destroyed with its contents.

Youngstown, Ohio—The Carbon Limestone Co. is now shipping flux-stone for blast furnaces in the valleys at the rate of 35,000 tons a month. During the low point in the industrial depression, shipments had virtually ceased for a time owing to reduced blast furnace operation. In 1921 the company shipped 30,000 tons of agricultural limestone, but shipments are now at the annual rate of 50,000 tons.

Cement Products

A concrete pipe factory is to be opened in Aberdeen, Wash., by the Harold Blake Co., and will be located on Arthur street, near Stewart Park.

The Kentucky Concrete Pipe Corp. has been incorporated in Frankfort, Ky., with a capital of $25,000, by Samuel A. Barber, C. O. Barber and Alex E. Johnson.

The Baltimore Cement Products Co. has been incorporated in Baltimore, Md., with a capital stock of $25,000, by Geo. S. Hiller, Herbert L. and D. Lee Bowen, and will manufacture cement laundry trays, blocks, etc.

Sand and Gravel

The Sac River Sand and Gravel Co., of which A. C. Duvall of Kansas City, Mo., is president has under construction a $30,000 gravel pit in Osceola, Mo.

Elizabethton, Tenn.—The Smith & Price Sand and Gravel Co. has begun operations as sand producers in Elizabethton, according to W. W. Smith of that company.

Monroe, La.—The Louisiana Sand and Gravel Co., which recently organized with a capitalization of $100,000 will begin operating its large pit a few miles west of West Monroe about March 15. T. E. Stephenson, president, announced. The company has just completed a plant which cost about $35,000.

The Penglass Engineering Co., recently incorporated for $50,000, will operate a gravel plant on the Wabash river at Grayville, Ill., a few miles west of Evansville, Ind. B. S. Alnutt, cashier of the National City Bank, Evansville, is secretary and treasurer; E. H. Flesher, of Mt. Vernon, vice-president.

G. N. Dulin, president and general manager of the Tory Hill Sand and Gravel Co., Mechanicville, N. Y., announces that this company has succeeded the Mechanicville Sand and Gravel Co. E. H. Welles is secretary and sales manager. The plant is on the Delaware & Hudson railroad at Mechanicville.

Columbus, Miss.—The New Hope gravel pits were sold to local and Birmingham capitalists by W. H. Rucker. The pits will be operated in the future by the newly organized corporation, the stockholders of which are Frank Nelson, Jr., millionaire capitalist of Birmingham; Solon Jacobs, prominent business man of Birmingham; W. H. Rucker, Henry Beard, T. W. Townsend and Gus E. Hauser, all of Columbus. The new corporation has a capitalization of $100,000 and plans are being perfected for extensive production at the big pits east of Columbus. A large sales force will be in the field, and gravel from Columbus will be shipped in large quantities to all sections of Mississippi and Alabama.

Manufacturers

The Fuller-Lehigh Co., manufacturers of rock products equipment, Fullerton, Pa., announces that it has discontinued its Chicago office, effective April 1.

The Sandvik Steel, Inc., announces the consolidation of their general steel and steel belt conveyor departments, Woolworth building, New York City. W. D. Thomas is president and general manager; Anders Johnson, vice-president; Gurrick M. Spencer, secretary, and Harry Carlson, sales manager.

A. P. McCallie, general agent for the Blue Diamond Mortar Co., Atlanta, Ga., announces that its new equipment has been ordered and that construction work will be completed by the end of June. This company will produce wet lime mortar and plaster gaged with Keene's cement and lime putty. Special machinery has been designed to the end that a uniform product will be insured.

The road machinery department of the Beaumont Mfg. Co. has been taken over by H. J. Kaltenthaler, whose offices and factory are located at 236 Cherry street, Philadelphia. In addition, a foundry and machine shop are located at Kutztown, Pa. W. T. Ruth, previously connected with the Good Roads Co. and the R. H. Beaumont Mfg. Co., is now with H. J. Kaltenthaler. The company plans to manufacture road machinery on a larger scale than formerly and is in position to make immediate shipment of practically all sizes of crushers and road machinery as well as elevators and screens.

The Chain Belt Co., Milwaukee, Wis., has announced the appointment of G. F. Sherratt as manager of the Pittsburgh office, in the Union Arcade Building. Mr. Sherratt will be in charge of all the company's chain and engineering business in the Pittsburgh territory and is equipped to render engineering service on power transmitting and material handling problems. Chain Belt Co. specializes on chain and material handling equipment for all industries; its products are manufactured under the trade-name of "Rex." The Ward Equipment Co., Pittsburgh, will continue to handle the complete line of Rex concrete mixers and pavers, and the United Equipment Co. the Rex traveling water screens.

Personal

J. A. Schearer, president of the Indiana Gravel Co., has been elected vice-president of the Lowrey Nursery and Landscape Co., a new organization in Indianapolis.

L. H. Hart, formerly with the National Lime Association, has organized the L. H. Hart Building Lime Service, Buffalo, N. Y., which undertakes the solution of various problems concerned with the uses of lime.

Trade Literature

"Labor Saver"—The March issue of this Stevens-Adamson Mfg. Co. house organ describes what is called "the largest office building in the world devoted to one industry"—the Genera Motors building, including the "S-A" equipment for its power plant. There are also interesting articles on "Glass Annealing in Great Britain," "Helping Uncle Sam Handle the Mails," etc.

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

HAVE YOU ANY PROBLEMS

relating to the location of quarry properties; appraisals for valuation; cost installation; production control; executive control, etc.?

Consulting industrial engineer specializing in these problems pertaining to the rock products industry, is open for a few more engagements.

A strictly personal service to operators who desire to make larger profits. Address

Box 1547, Care of Rock Products
542 S. Dearborn St. Chicago, Ill.

WANTED

Position in Southeastern States, Mexico or South America as operator or executive of cement plant, large quarry or crushing plant. Qualified for general manager or general superintendent. Over fifteen years' experience in the operation of cement plants and construction of same, quarry work, explosives and crushing plants. Address

Box 1556, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

WANTED

A competent man to superintend Silica Sand producing plant, where sand is produced from solid rock. One familiar with crushing machinery, locomotive crane and generally informed on production methods. References required. Address

Box 1550, Care of Rock Products
542 S. Dearborn St. Chicago, Ill.

BUSINESS WANTED

I want to lease on royalty basis, or I will buy on suitable terms, good gravel land on which to erect a gravel plant. Must be located on railroad not far from a good city or where I could reach several railroads. Or I would consider the purchase of a good small plant now in operation.

C. J. M., Care Rock Products
542 S. Dearborn St. Chicago, Ill.

Superintendent Wanted

Married man with experience in operating crushing and pulverizing plant. Must be good executive and willing to work. Give references, and salary wanted in first letter. Address

Box 1553, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

WANTED

Superintendent for large modern lime plant. Must be familiar with gas producers, Kritzer Hydrating System, open face and mine quarrying. Give age, experience and salary expected. Good salary and prospects. Quick reply. Address

Box 1555, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

WANTED

Experienced mill foreman for Portland cement plant in Kansas district. Address

Box 1554, Care Rock Products
542 So. Dearborn St., Chicago, Ill.

POSITION WANTED

Superintendent desires engagement where thorough knowledge of steam shovel operation, transportation, heavy blasting and operation in detail are essential to production. Excellent reference. Address

Box 1548, Care of Rock Products
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"DREDGING PUMP" FOR SALE

One 10" Morris Sand and Gravel dredging pump, 10" suction, 10" discharge, direct connected to double 9x9 engines.
One Scotch Marine Boiler, 200 H. P.

M. A. CALLAHAN
"The Sand Man"
Schofield Bldg. Cleveland, Ohio

FOR SALE

2000'—16-lb. Track, 30" gauge.
12—1-yd. U Dump Cars, 30" gauge.
5—Turntables.
6—End Dump Quarry Cars.
2—Gable Side Dump Cars.
New and Relay Rails.

IVANHOE EQUIPMENT CO.
1130 Ivanhoe Road Cleveland, Ohio

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

FOR SALE

1—42-ton Standard gauge Baldwin Mogul, 160-lb. Steam.
1—36-ton Standard gauge Baldwin Mogul, 11' wheel base.
2—50-ton Standard gauge Brooks 6-wheel switchers, 160-lb. steam.
1—50-ton Standard gauge Shay geared locomotive.
1—42-ton Standard gauge Shay geared locomotive.
2—23-ton brand new 36" gauge Porter 6-wheel switchers, separate tenders.
2—18-ton O & S 8-wheel two-line locomotive cranes.
1—14-B Bucyrus Steam Shovel, mounted on traction wheels.

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—⅝ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

FOR SALE

1—No. 5 Austin Crusher, Direct Drive.
1—Three-Roll Bradley Pulverizer.
1—Three-yard Dirt Dipper, with reversible manganese points for 70 or 70C Bucyrus Shovel.

This equipment is in A-1 operating condition and should be sold direct to users.

Box 1534, Care of Rock Products
542 S. Dearborn St. Chicago, Ill.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building Pittsburgh, Pa.

Used Equipment

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RETURN TUBULAR LOCOMOTIVE BOILERS WATER TUBE SCOTCH MARINE

A LARGE STOCK OF HIGH-GRADE BOILERS OF PRACTICALLY ALL SIZES, TYPES AND MAKES, TAKEN OVER FROM DU PONT CHEMICAL COMPANY'S AND OTHER PLANTS WITH PRODUCTION RECORDS—RECONDITIONED, OFFERED SUBJECT TO ANY INSPECTION, AVAILABLE *NOW!*

"SAVE TIME AND MONEY ON YOUR POWER INSTALLATION— LET DAVIS FURNISH THE BOILERS"

LONG DISTANCE TELEPHONE RANDOLPH 2232

J. F. DAVIS

1122-1123-1124 Harris Trust Building CHICAGO, ILL.

FOR SALE

2—8x110′ Rotary Kilns.
6—5x6x7x110′ Rotary Kilns.
3—6x16′ Tube Mills, Silax Lining
9—5x21′ Tube Mills, Steel Lining.
6—250-Hp. Oil City Water Tube Boiler
1—No. 5 Gyratory Crusher.
1—Coal Dryer.
1—Rock Dryer
8—Krupp Ball Mills.
1—No. 8 Austin Crusher.
4—Engines, 200 to 500 Hp.
8—33″ Fuller Mills.
8—42″ Fuller Mills.

Shafting, Pulleys, Bearings and Elevator Equipment, all first-class operating condition.

Fifty Acres of Land and Five Buildings, Stone and Steel Construction.

ENGINEERING SALES COMPANY, Nashville, Tenn.

OLLIE LAWRENCE, Stockertown, Pa.

IMMEDIATE DELIVERY

Send Us Your Steam Shovel Inquiries

No. 18K GATES CRUSHER.
50—75-Hp. Single Drum Hoists, 25 Cy. Motors
25—40-50-Hp. D. D. Hoists, 60 Cy.
Nos. 3-5-6-7½ and 8K CRUSHERS.
6- and 12-Ton Gasoline Locomotives.
10x12-in. Steam Hoist, 3 Drum with Boiler.
60-Hp. Locomotive Type Boiler.
150-Hp. Boiler, Buttstrap with Stoker, 156 lbs.
100-TON 2½-YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Comp'a.
JAW AND ROLL CRUSHERS.
10—15- and 20-Ton Locomotive Cranes.
Large amount Contractors' Equip., Towers, Derricks, etc.

Send us your inquiries for Steam Engines, Centrifugal Pumps, Quarry Equip., etc.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

FOR RENT AND FOR SALE

10—6-yd. rebuilt dump cars, std. gauge.
20—12-yd. Westerns, like new, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader.
1—Osgood 18 revolving shovel, traction wheels. No. 794, ¾-yd. bucket, used 8 months.
1—Class 14 Bucyrus dragline on caterpillars, 70-ft. boom, 2-yd. bucket, used 6 months.
1—Marion 76 steam shovel, No. 3503, std. gauge.
1—No. 2 Brownhoist, 4-wheel gasoline crane, std. gauge, 40-ft. boom, ½-yd. bucket, new 1921.
64—40-ft. NEW 80-lb. 18-in. I beams, not drilled.
1—NEW Lakewood concrete chuting system.
6—NEW wood-burning locomotive stacks.

LOCOMOTIVES

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14, and 10-ton Vulcans, 36-in. gauge.

INDUSTRIAL EQUIPMENT CO.
McCormick Building Chicago, Ill.

FOR SALE

10x14 in. Vulcan, 12-ton dinkey, 36-in. gauge.
Marion dragline excavator, 50-ft. boom, shop No. 4058.
Williams swing hammer pulverizer, No. D-43.
40—4-yd. side dump, 36-in. gauge Western cars.
2—American Process dryers, 24 ft. long by 48 in. diam., sprocket driven.
125 h.p. 16x24 in. steam engine.
Worthington steam pump, 10-in. intake, 8-in. discharge, 20-in. cylinders—Shop No. 16876.

E. W. COOPER, Engineer
Nashville Tennessee

FOR SALE

No. 7 Smidth Ball Mill Parts: 10—Manganese Steel Grinding Plates. Other miscellaneous parts, including head, plates, screens, etc.

No. 7 Gates Ball Mill Parts: 10—Manganese Steel Grinding Plates. Other miscellaneous material, such as plates, screens, etc.

This material is all brand new. For price and particulars, address

PHOENIX PORTLAND CEMENT CO.
Nazareth, Penna.

SECOND-HAND EQUIPMENT

No. 7½ Kennedy gyratory crusher.
No. 5 Gates gyratory crusher.
9x18 jaw crusher.
50-ft. bucket elevator and 3x16 revolving screen.
Keystone Excavator (ditcher and skimmer scoops).
65-ton Bucyrus shovel 2¼ on railroad trucks.
Thew full revolving traction shovel, ⅜ yd.
Byers auto crane, 32 ft. steel boom, ¾ yd. bucket.
⅜-yd. caterpillar drag line, 40-ft. boom.
15-ton full revolving locomotive crane.
Switcher, 6-wheel.
½-yd. Pioneer cableway bucket with hanger.
15 cu. ft. Hayward orange peel bucket.
Sturdevant rolls, 20x14 with feeder.
Holt tractor and Port Huron trailers.
2 miles 24″ gauge portable track, 24″ gauge.
30 steel cars, 24″ gauge, 1½ yd.
2 locomotives, gasoline, 3-ton, 24″ gauge.
Bargain prices. Can give terms.
LOCK BOX 205, CROWN POINT, INDIANA.

WANTED

Two 10- or 12-ton Shay Locomotives for 2-ft. gauge; also Industrial Railway Equipment for highway construction, Lakewood Type with batch boxes. Give full particulars. Address

Box 1552, Care of Rock Products
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ROCK DRILLS

Brand new "Wood" Improved Rock Drills.

6—2″
2—2¼″
1—2½″
2—3⅝″

Price about one half regular current prices

Write for complete Stock List

Machinery & Supply Corporation
Joplin, Missouri

WANTED

24″ Symons disc crusher, late model, and first-class condition.

Williamsport Sand & Gravel Sales Co.
Williamsport, Penna.

PULVERIZED LIMESTONE
WASHED SAND & GRAVEL
AGRICULTURAL LIMESTONE

Complete machinery equipment and detail plans of structures and arrangement of machinery for plants of the above nature.

S. G. ARTINGSTALL, JR., M. E.
First National Bank Bldg. Chicago, Ill.

One Billion Dollars

This is approximately the amount of money that will be spent on good roads during the coming year.

Is your plant in proper condition so that you may get your share of this tremendous business? Now is the time to make the necessary changes. We can give you a real engineering service, a service without prejudice, a service that considers only the particular needs of the producer. Quick action will be profitable.

James N. Hatch, C. E., M. E.
Member A. S. C. E.
CONSULTING ENGINEER
736 1st Natl. Bank Bldg. Chicago, Ill.

Robert W. Hunt Jno. J. Cone D. W. McNaugher

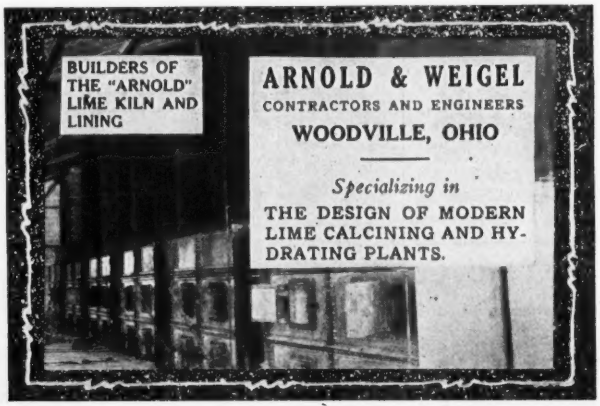
ROBERT W. HUNT & CO.
Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

New York CHICAGO Pittsburgh
St. Louis Kansas City Cincinnati San Francisco


BUILDERS OF THE "ARNOLD" LIME KILN AND LINING
ARNOLD & WEIGEL
CONTRACTORS AND ENGINEERS
WOODVILLE, OHIO
Specializing in
THE DESIGN OF MODERN LIME CALCINING AND HYDRATING PLANTS.

WE DESIGN AND EQUIP COMPLETE PLANTS

for the manufacture of gypsum products, such as wall plaster, moulding plaster, wall board products, gypsum block products, also mixing plants.

We are prepared to furnish complete machinery-equipment and design and furnish plans for the installation. Consult our Engineering Department. Forty years' experience in designing of wall plaster machinery and plants.

The J. B. Ehrsam & Sons Mfg. Co.
Engineers, Machinists and Founders
Enterprise, Kansas
Western Sales Representative
J. J. Abramson, 612 San Fernando Bldg., Los Angeles Calif.

FULLER PRODUCTS
Insure Fullest Satisfaction

Crushing Rolls.
Pulverizer Mills.
Direct and Indirect Fired Dryers.
Ball and Tube Mill Liners and Partition Plates.
Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

Ask for catalogue and prices

FULLER-LEHIGH COMPANY
Fullerton, Pa., U. S. A.

F. L. SMIDTH & CO.
50 CHURCH STREET NEW YORK

Engineers

CEMENT MANUFACTURING PLANTS
CEMENT MAKING MACHINERY
PULVERIZED COAL INSTALLATIONS
GRANULATING AND PULVERIZING MACHINES FOR ALL MATERIALS
FLINT PEBBLES—SILEX LINING
THE LENIX BELT DRIVE

Albany
Registered U. S. Patent Office
For Shafting and Machinery
The trade mark identifies the real Albany Grease—a mark known and respected around the world since 1868, for fair dealing, a quality product and an unexcelled service.
Your dealer stocks it.
Adam Cook's Sons
708 Washington Street, New York
Grease

The WILLIAMS "Hercules"

It Stands Up - *because*

TRIANGULAR CONSTRUCTION: In every WILLIAMS Clamshell, the head bearing is held perfectly rigid by the corner bars **meeting in a triangle instead of a quadrangle.** Even in the hardest digging, there is no "wobble" to a WILLIAMS. Sheaves are held perfectly in line—saving wear on sheaves and cable.

GET THE WILLIAMS CATALOG. It shows many interesting photos of every kind of clamshell work, and blue prints of the different types of WILLIAMS buckets. Glad to send you a copy—no obligation.

G. H. WILLIAMS CO., Erie, Pa., U.S.A.

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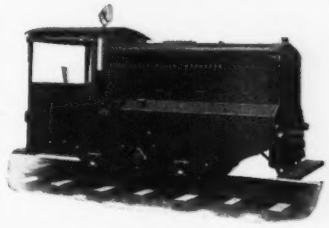
QUICK-ACTING CLAMSHELLS

All Parts Guaranteed Against Breakage

Minster Gasoline Industrial Locomotives



Model "F"—Six Ton

GUARANTEE ECONOMICAL PRODUCTION

There is great satisfaction in good equipment.

We have a size for your purpose.

Experience, the Best of Material, Careful Workmanship, and Rigid Inspection Enable Us to Maintain Leadership.

The Industrial Equipment Co.
310-316 Ohio Street
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Formerly the Cummings Machine Company

Eastern and Export Dept.
The Herbert Crapster Co., Inc.
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The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the second issue of each month.

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Worcester, Mass.

Pittsburgh Office: 704 Arrott Bldg. Telephone Court 1381

THE McMYLER

THERE is power built into each machine, a ruggedness that can be depended on to stretch out into months and years of flawless service.

Try out the Type "J" Locomotive Crane and its operation will convince

THE McMYLER INTERSTATE CO.
Cleveland, Ohio

BRANCH OFFICES:

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Chicago, Ill., 812 Edison Bldg.
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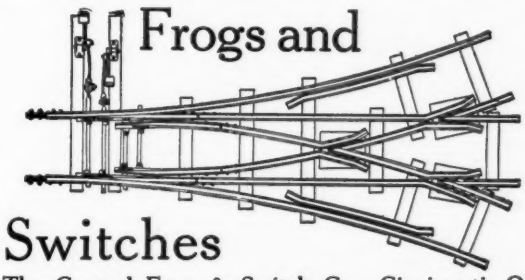
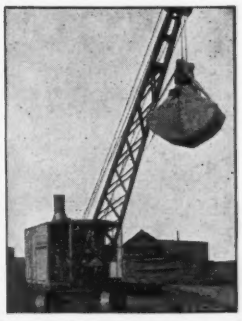
San Francisco, Calif., 766 Folsom Street
New Orleans, La., 444 Maison Blanche Annex
Birmingham, Ala., Brown-Marx Building
Boston, Mass., 261 Franklin St.

Frogs and Switches



The Central Frog & Switch Co., Cincinnati, O.

Frogs, Switches, Crossings, Switch Stands, Rails, Angle Bars, Fishplates, Throws, Rail Braces, Tie Plates, Portable Track, Etc., Etc.



BYERS *Model "10"*
Full Circle Crane

OPERATOR can raise or lower the boom *under absolute control* while lifting or dropping bucket, rotating, or traveling. Exclusive Byers feature; many other points just as important—study them *all* in interesting Bulletin, just out.

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The Byers Machine Co.
310 Sycamore St., Ravenna, O.
Agents in Leading Cities

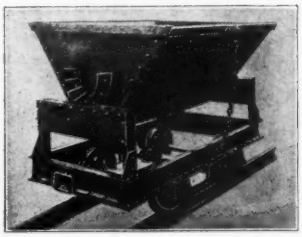
We Look Into the Earth

By using Diamond Core Drills. We drill for **Limestone, Gypsum, Talc, Fire Clay, Coal** and all minerals.

We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

Strongest and Cheapest Quarry Car



on the market. That is what quarry men tell us who are using our Standard 72" Side Dump Quarry Car for 24" standard gauge track.

Equipped with Steel Pin Rockers and Brass Journals that can be replaced instantly.

Write for Complete Details and Prices.

GEHRET BROTHERS

Manufacturers of Structural Steel, Ornamental Iron Work, Quarry Cars, etc.

Bridgeport, Montgomery County, Pa.

CARS

WE MAKE CARS FOR COAL, ORE, STONE, SAND, GRAVEL, CLAY AND BRICK. DRYER AND INDUSTRIAL CARS. THE WATT FACTORY IS THE LARGEST IN THE WORLD DEVOTED ALONE TO CAR BUILDING OVER 50 YEARS' EXPERIENCE

CATALOGS

The Watt Mining Car Wheel Co.

BARNESVILLE, OHIO

SCREENS
OF ALL KINDS

Chicago Perforating Co.

2445 West 24th Place

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PERFORATED SCREENS
and Steel Plate Work

W. TOEPFER & SONS COMPANY

Milwaukee Wisconsin

"A FLORY HOIST For Every Purpose"

HOISTS

CABLEWAYS

DREDGING MACHINERY

S. FLORY MFG. CO.

BANGOR, PENNSYLVANIA

New York, 95 Liberty St.; Pittsburgh, House Bldg.; Birmingham, Chas T. Lehman; Chicago, Monadnock Block; Hartford, K. B. Noble Co.; Huntington, W. Va., Banks Supply Co.

TERRY

FAMOUS DERRICK IRONS, FITTINGS AND ERECTORS' TOOLS

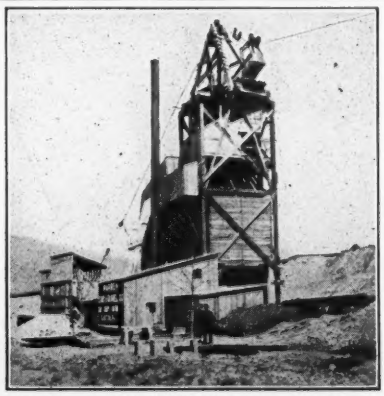
"FULL CIRCLE CRANES. "EQUIPMENT THAT LASTS." TIMBER & STEEL DERRICKS

LET US SOLVE YOUR MATERIAL HANDLING PROBLEMS.

All Types of

Steel and Timber DERRICKS

TERRY



SAND and GRAVEL PLANTS

Designs and Estimates to suit your exact conditions.

Also crushing plants new and second-hand

Send for Catalogue

The Cable Excavator Company

2d and Railroad Ave. Fernwood, Del. Co., Pa.

RELEASE THAT STEAM SHOVEL

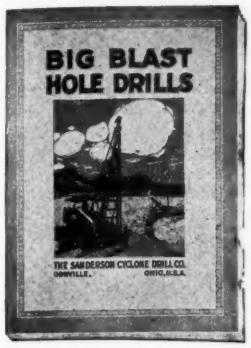
for other work and load your trucks with a

Robins Portable Conveyor

It will cut your handling costs to a minimum. SAVINGS AS HIGH AS 75% CAN BE EFFECTED. Write for bulletin.

ROBINS CONVEYING BELT COMPANY

New York Chicago Pittsburgh Boston



Analyze Your Drilling and Blasting

Our new Blast Hole Catalog B-46 (96 pages) will help you.

The day of poking a hole down with a rivet header or a converted hay bailer is past.

Drilling, being the first step in stone production, is the most important. One cent or one-half cent per ton cost saved in this operation often eliminates competition.

With Cyclone No. 14 Drills on the job and Cyclone Service in reserve, your drilling and blasting troubles fade—and your costs will be right.

THE SANDERSON-CYCLONE DRILL CO.
Orrville, Ohio
Eastern and Export Office, 30 Church St., New York

Gruendler Hercules Crushers

Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

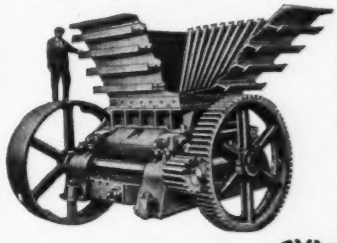
"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

Write for Interesting Bulletin

Gruendler Patent Crusher & Pulverizer Company
908 North Main Street St. Louis, Mo.

"PENNSYLVANIA" Single Roll Crusher



The New Series of "Pennsylvania" Single Roll Crushers take grab-bucket feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment.

Put Your Reduction Problems Up to Us

PENNSYLVANIA CRUSHER COMPANY

New York
Pittsburgh

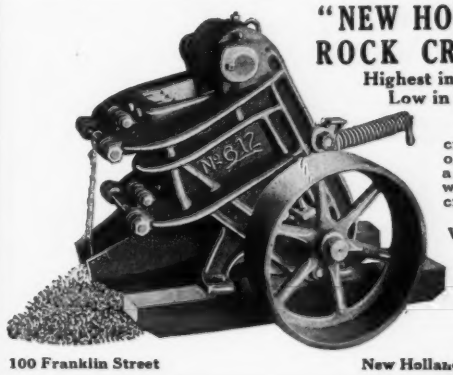
Stephen Girard Bldg., Philadelphia

BACON~FARREL ORE & ROCK CRUSHING~WORLD KNOWN ROLLS~CRUSHERS

EARLE C. BACON, INC. ENGINEERS
26 CORTLANDT ST., NEW YORK

"NEW HOLLAND" ROCK CRUSHERS

Highest in quality
Low in price



Guaranteed to crush all kinds of rock for road and concrete work, ores, coal, cinders, etc.

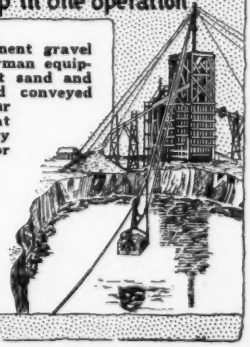
Write for full particulars

New Holland Machine Company
100 Franklin Street New Holland, Pa., U. S. A.

SAUERMAN DRAGLINE CABLEWAY EXCAVATORS

dig, convey, elevate and dump in one operation

Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.



Write for Catalog No. 7

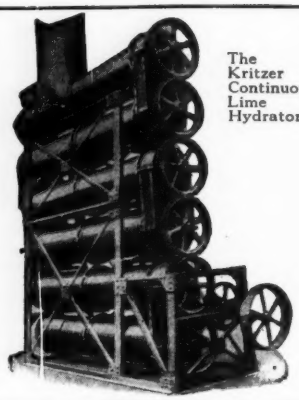
Sauerman Bros.
1140 Monadnock Bldg.
Chicago
Also Mfrs. of Power Scrapers

AUTOMATIC Aerial Tramway

The trans-aerial method solves your difficult transportation problem in the most effective and economical manner.

Let Us Demonstrate

INTERSTATE EQUIPMENT CORPORATION
25 Church Street New York City



The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY

503 South Jefferson Street CHICAGO, ILL.

The Clyde Lime Hydrator Performance Counts

The Clyde was first in the field, and through dependable and economical performance is still first choice of lime operators.

The Clyde Hydrator produces big capacities of lime at only three-fifths the cost of any other hydrator on the market.

The Clyde not only produces over 90% of the hydrate of America, but makes the best quality of finishing lime from either high calcium or magnesium.

Simple, easiest to operate and most economical in cost of installing, maintaining, and operating.

Send for Catalog

H. MISCAMPBELL

Patentee and Sole Manufacturer

DULUTH - - MINNESOTA

INTERNATIONAL BARRELS

are without equal for quality, strength and durability

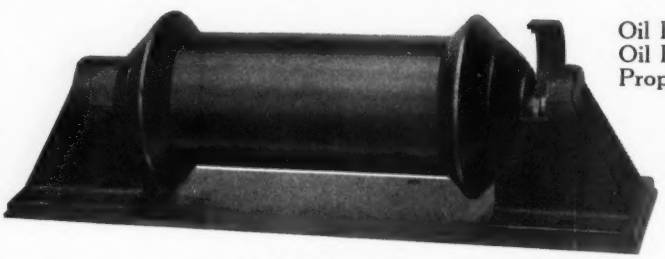
They are the best containers used in the Lime, Cement and Plaster Trades.

Our several branch shops permit quick deliveries of these QUALITY BARRELS to your plant, wherever it is located.

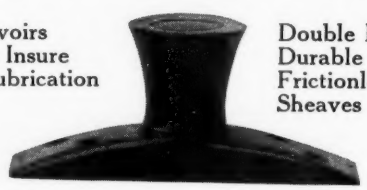
Samples and prices sent on request

International Cooperage Co., Inc.

Niagara Falls, N. Y.



Oil Reservoirs
Oil Rings Insure
Proper Lubrication



Double Bearing
Durable
Frictionless
Sheaves

ROLLERS AND SHEAVES BUILT FOR SERVICE.

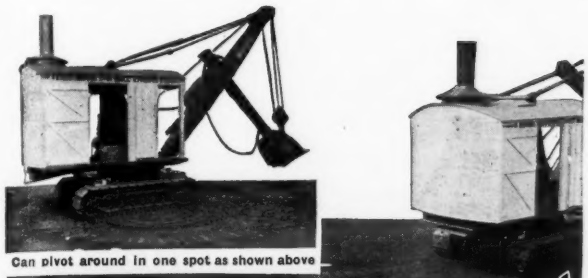
LOW ORIGINAL COST—INSTALLATION—UPKEEP

Send for Descriptive Catalog

CHICAGO MINING SHEAVE AND ROLLER CO.

2320 CHICAGO AVENUE

CHICAGO, ILL.



Can pivot around in one spot as shown above

Perfect Power Steering from the Cab

The caterpillar type ERIE steers perfectly, by power, from the cab — making either sharp or gradual turns as desired. No man is needed to walk alongside and throw clutches to steer.

The elimination of this clutch-throwing job cuts one needless man off the payroll. This is just one of the many ways in which the caterpillar type ERIE saves you money.

For working over soft ground, a caterpillar type ERIE means the saving of thousands of dollars to you. We would like to tell you about its many advantages in detail—and send photos. Write for bulletin P-60.

And in many other ways the caterpillar type ERIE is far superior

FULLY LUBRICATED: Treads, links and rollers are automatically lubricated by internal reservoirs.

ALL STEEL TREADS that are almost indestructible.

CLIMBS GRADES as steep as 30%, and travels several times as fast as is possible without lubrication.

EASILY INTERCHANGEABLE with traction wheel mounting on the same truck frame.

IN EVERY WAY, fully up to the standard of the ERIE Shovel.

ERIE STEAM SHOVEL CO.
Formerly BALL ENGINE CO., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

THE GAYCO-EMERICK
CENTRIFUGAL AIR SEPARATOR

The first radical improvement in fine separation in a century

A principle which makes obsolete all other separating methods

60 mesh to 350 mesh

For limestone, coal, clay, silica, talc, graphite and all other dry ground materials

Increases B. P. L. content of Phosphate Rock

Write for Bulletin C

RUBERT M. GAY COMPANY
114 Liberty St. New York, N. Y.

BERRY'S FLEXIBLE PIPE JOINTS

For Pontoon Lines Have Revolutionized Hydraulic Dredge Boat Work

With Patented Locking Device

1" to 4" of Brass for Steam, Air, Oil and Water

6" to 12" Without Locking Device. (Made of Cast Steel)

These Joints are made of the best quality cast steel and brass and are stronger than the pipe itself. They will take any angle up to 17 degrees without leaking. If you are troubled with leaking joints on your pipe line, Write Us.

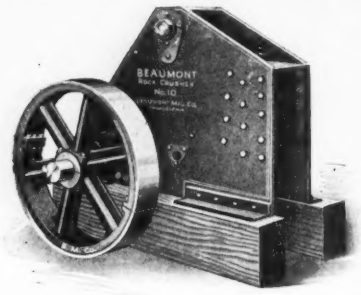
Berry Flexible Pipe Joint Co. **26 South 15th St., Philadelphia, Pa.**

STURTEVANT "ONE-MAN ONE-MINUTE" "OPEN-DOOR" MACHINERY

Crushing, Grinding, Pulverizing,
Screening, Sizing, Air Separating, Mixing,
Weighing, Elevating and Conveying Machinery
Complete Units -:- -:- Engineering Service

STURTEVANT MILL CO., HARRISON SQUARE BOSTON, MASS.

BEAUMONT
ROCK CRUSHERS



Built for great strength where hard crushing, portability and efficiency are required

Size	Jaw Opening	Tons Per Hour	H.P. Required	Weight
9	9″x15″	12-18	15	8,500
10	10″x20″	16-24	18	12,300
12	12″x26″	25-35	25	19,900

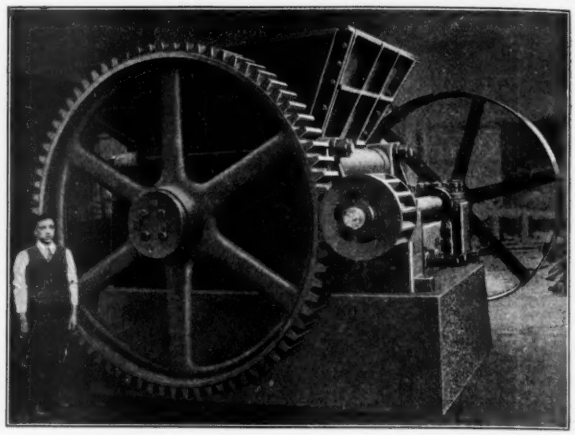
Immediate Shipment can be made on above size Crushers.

Beaumont Screens
Beaumont Elevators

Send for prices and full information on our equipment.

Manufactured by

H. J. KALTENTHALER
236 Cherry Street Philadelphia, Pa.

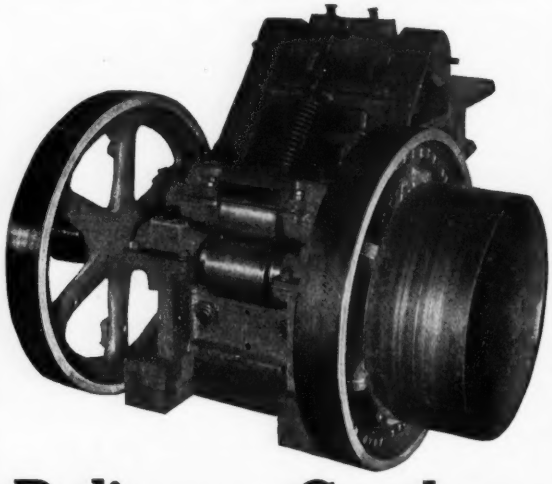


If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.
Hollidaysburg, Pa.
Screens, Elevators, Conveyors, Rock Washers, Etc.



Reliance Crushers

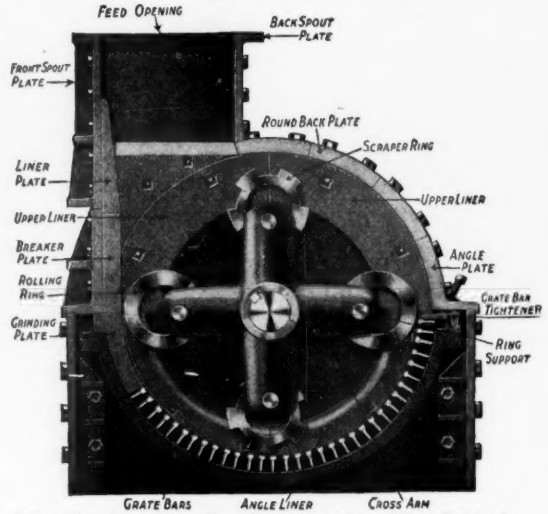
IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.
Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT

Greater Tonnage Lower Operating Cost



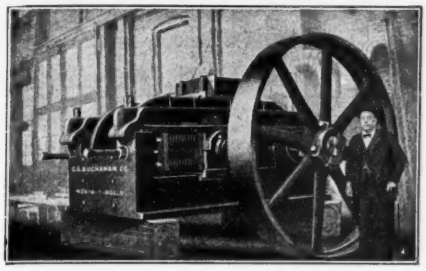
Cross Section of the Standard American Ring Pulverizer

The flexibility of the Rolling Rings prevents break downs or damage to the Pulverizer caused by foreign material passing into the machine.

Write us for particulars

AMERICAN PULVERIZER COMPANY
Gen. Office and Factory: 18th and Austin Sts.
ST. LOUIS, MO.

BUCHANAN CRUSHING ROLLS



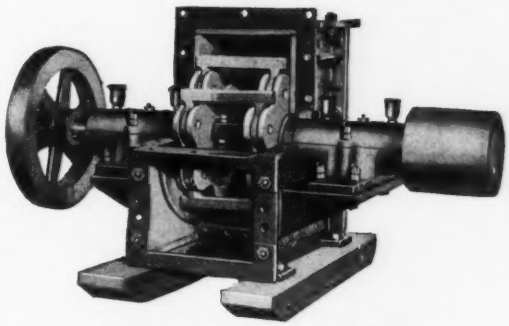
Type "C" Buchanan Box Bed Crushing Rolls for Heavy Duty Bulletin No. 13

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

COMPLETE CRUSHING PLANTS

C. G. BUCHANAN CO., Inc.

Cedar and West Streets NEW YORK CITY



Interior of K-B Pulverizer showing Manganese Steel Lining Plates

Does the material you're handling pulverize your Pulverizer?

All parts of the K-B Pulverizer that come in contact with the material to be crushed are made of Manganese Steel—the best material obtainable for the duty required

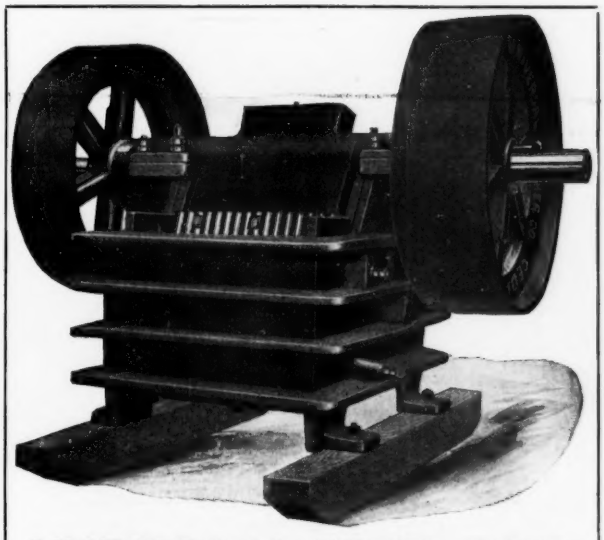
Only Steel willl stand the stress

K-B is built ALL steel

K-B PULVERIZER

Send for Catalog with full particulars

K-B Pulverizer Company, Inc.
92 Lafayette Street, New York



UNIVERSAL STEEL LINE

THE PERFECT GRAVEL AND REJECTION CRUSHER

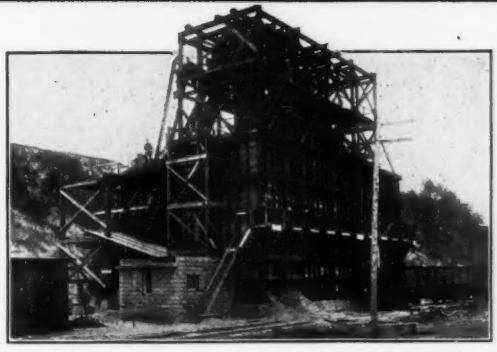
Sizes up to 8"x36". Capacities 20 to 200 tons daily. Crushes to ¾" and finer if desired. Has no superior for FINE CRUSHING and UNIFORMITY of product.

STRONG LIGHT DURABLE ECONOMICAL

UNIVERSAL CRUSHER CO.

225 Third Street Cedar Rapids, Iowa, U. S. A.

Clean Sand



This plant produces CLEAN SAND. The dependable

G-R-M SAND SETTLING TANK

does the work. The sand is WASHED AND DRAINED

Fine sand may be rejected at will by the use of the adjustable overflow

No matter how dirty the sand, the G-R-M Sand Settling Tank will clean it. It churns up the sand, loosens the dirt, and floats the foreign matter off at one end, while the clean sand is taken out from the other end.

SEND FOR INFORMATION—USE THE COUPON

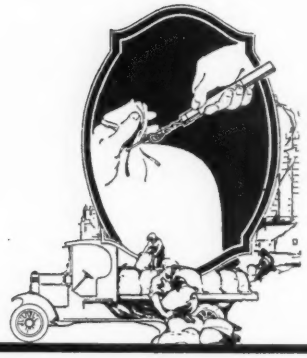
GOOD ROADS MACHINERY Co 1203 Tower Bldg., Chicago

Good Roads Machinery Co., 1203 Tower Bldg., Chicago, Ill.
Gentlemen: You may send me additional information concerning the G-R-M Sand Settling Tank.

Name_____

Address_____

We are now washing_____tons of sand per day.



BATES WIRE TIES

have long since been universally accepted as the most secure, saving, and efficient means for closing bags of all sizes and descriptions.

OVER THREE HUNDRED MILLION BAGS were closed the Bates Way during 1921 in the Rock Products Industries alone.

A Free trial of Bates Wire Ties will convince you and will show you how we save time and money for our big family of satisfied customers.

A Free Trial Outfit

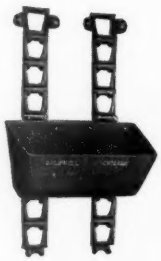
consisting of one tying tool and liberal samples of wire ties suitable for your purposes will be gladly sent upon receipt of your agreement to try it on your work and within fifteen days send us $3.50, the price of the tying tool, or return it to us. The sample wire ties cost you NOTHING.

BATES VALVE BAG COMPANY

7326 South Chicago Ave. Chicago, Ill.

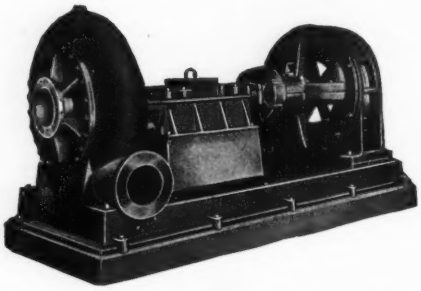
110 Great Portland St. London, W. I., England

CALDWELL Service



HALF a million dollars worth of well selected stock, constantly maintained, and an organization keyed up to the theory that plant efficiency is measured by the number of orders shipped on the day of receipt, accounts for Caldwell service.

H. W. Caldwell & Son Co.
LINK-BELT COMPANY, OWNER
CHICAGO
17th Street and Western Avenue
Dallas, Texas, 709 Main Street
New York, Woolworth Bldg.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4" up, arranged for belt, motor, or engine drive.

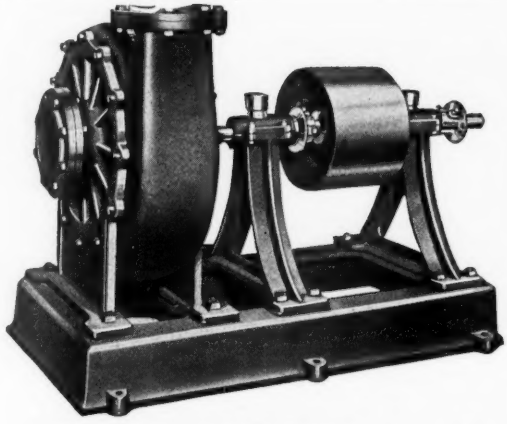
MORRIS MACHINE WORKS
Baldwinsville, N. Y.

39 Cortlandt St., New York City
Real Estate Trust Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines



The LIGHTNING Sand Gravel and Dredging Pump

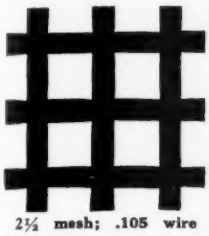
The durability and integrity of Lightning Sand Pumps, stamp them as the ideal pump for sand companies and contractors.

They are easy to operate, easy to adjust, and easy to replace parts. Shell and Runner made of Semi-steel.

Write for prices and complete information

Kansas City Hay Press & Tractor Co.
Kansas City, Mo.

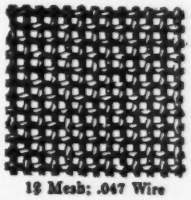
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2½ mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT

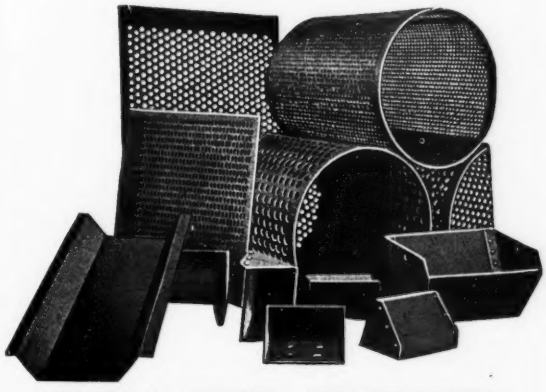


1¾ Mesh: .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3573 East 78th Street **Cleveland, Ohio**

Perforated Metal Screens
FOR
Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS
PLAIN AND PERFORATED

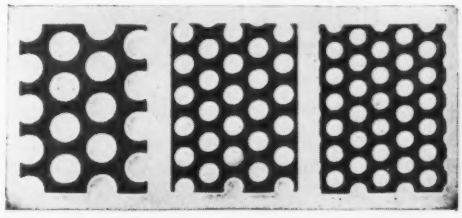
General Sheet and Light Structural Work

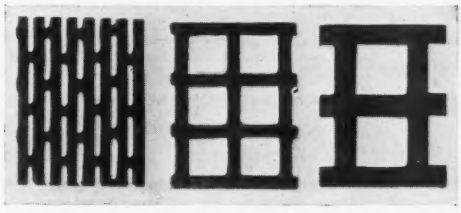
"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.
CARBONDALE, PA.

New York Office, 30 Church Street
Pittsburgh Office, 544 Union Arcade Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.

Perforated Steel Screens





For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

638 N. Union Ave., Chicago, Ill.
NEW YORK OFFICE: 114 Liberty St.

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS

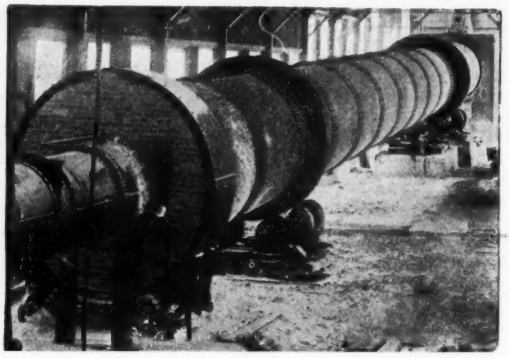
Perforated Steel Screens

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pa.



Labor costs are frequently halved when vertical kilns are replaced by Vulcan Rotary Kilns

—Also rotary kilns can be used for a great variety of processes and materials, where a vertical type cannot be employed.

The upkeep of the rotary kilns is less than that of any other type of kiln. It requires little attendance, wears for years and makes a relatively small demand upon the power plant. It has a high fuel efficiency, requiring from 20 to 30 per cent less fuel than the vertical kiln of the same capacity. It operates under continuous feed and discharge, and can be adapted to a variety of fuels.

VULCAN Rotary Kilns are a factor of economy in sixty-five industrial and manufacturing processes.

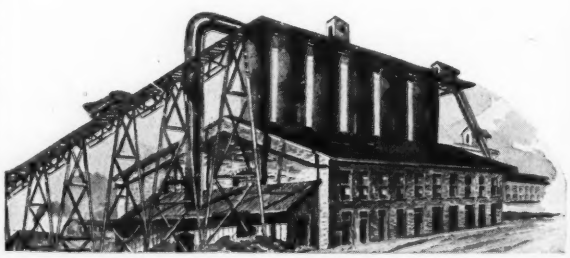
It may be the gateway to economical production in one of your processes.

Your inquiry is solicited.

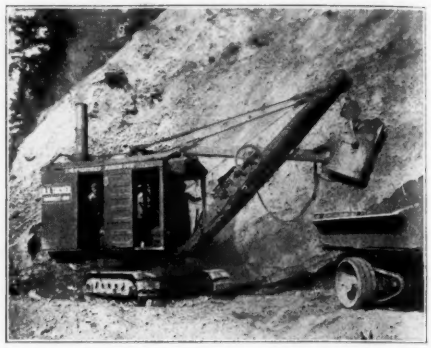
Vulcan Iron Works

"Established 1849"

1753 Main Street Wilkes-Barre, Pa.



OSGOOD



OSGOOD ¾ and 1 cu. yd. Revolving Shovels are noted for their ability to produce more yards at less cost due to their rigid and sturdy construction, simplicity of operation and long life.

Every piece of the Traction or Continuous Tread Mountings is of open-hearth, annealed cast steel. Quick Acting Power Steering Devices, Horizontal Hoisting Engines, Vertical Submerged Tube Type Boilers and the fact that Crane, Clamshell or Dragline features can be embodied in their construction are IMPORTANT TO YOU.

THE OSGOOD COMPANY
Marion, Ohio, U. S. A.

A *service*—not a truck. That's the way to think of a Pierce-Arrow. A means of transportation so sure, so dependable, so unfailingly reliable, that its performance need never be questioned or discounted.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

FACING CONCRETE WORK

Middlebury Terrazzo for the facing of all Concrete Products and Stucco Buildings gives the appearance of solid marble with a material saving in price.

This aggregate is made from Middlebury White and Creme Statuary Marbles, making a beautiful and everlasting face, giving the building a distinctive appearance, a richness of finish that can be obtained by no other facing.

This material is furnished, carefully graded to size, in either dust, No. 1, 2 or 3. Write for samples and prices

Middlebury Marble Company
BRANDON, VERMONT

METRO NITE

for Stucco

Metro-Nite White is a siliceous dolomite, extremely hard, sharp, cleanly graded and makes a bright, sparkling face for stucco buildings, concrete bricks or blocks.

It is generally accepted as the most beautiful and artistic facing known for this purpose, and we will gladly send samples to anyone who is interested in carload lots.

Metro-Nite can be delivered either in white or green.

THE METRO-NITE CO.
333 Hartford Ave., Milwaukee, Wis.

EVER-GREEN and EVER-RED Slate Granules

Ever-Green and Ever-Red Slate Granules, used in making slate surfaced roofing, slate flour as a filler in paints, mechanical rubber goods, linoleum, window shades, plastic roofing, roofing cement, and asphalt roads, can be used with telling effect

For the Facing of Concrete Blocks, Bricks or Stucco

The beauty, style and finish of a building covered with this material adds appreciably to its value.

It can be delivered carefully graded to size.

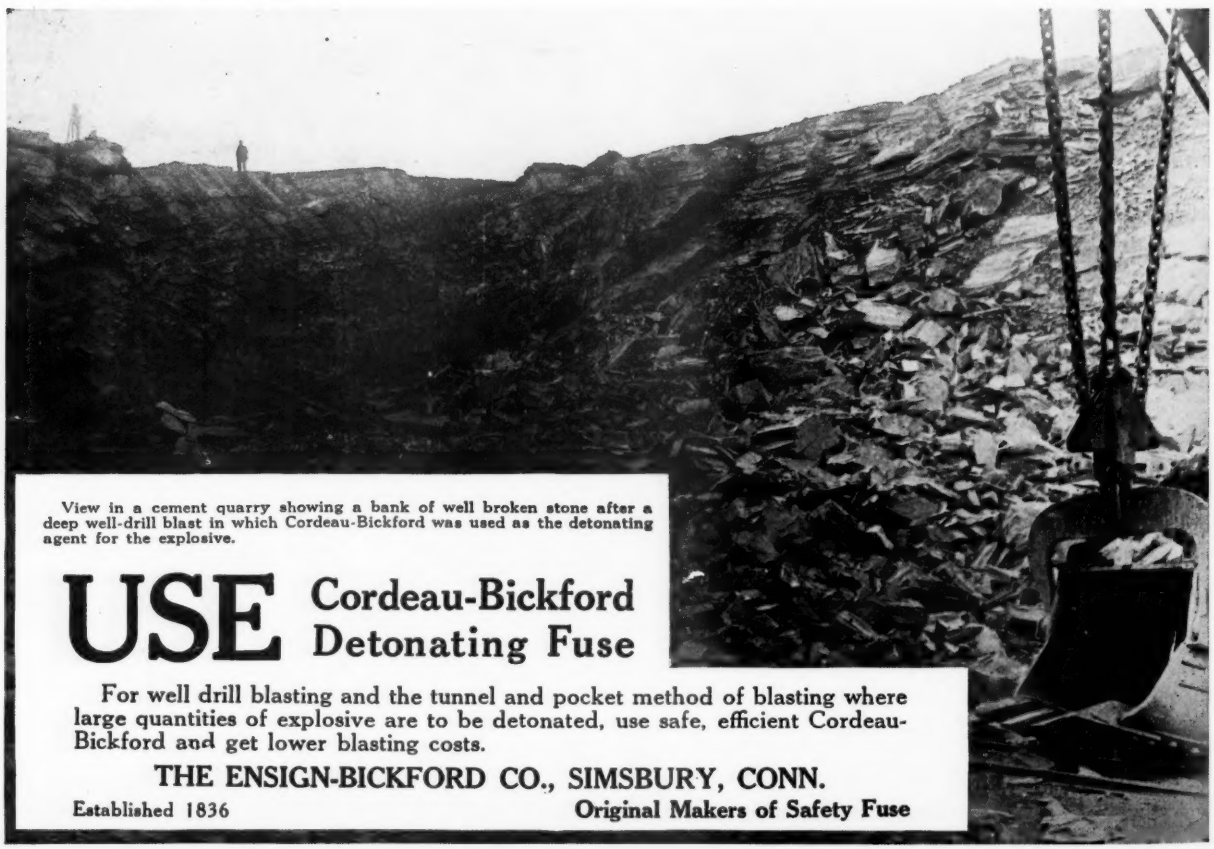
Write for samples and prices
VERMONT MILLING PRODUCTS CORP.
POULTNEY, VERMONT

Schaffer Lime Plants can be built in small units embodying all the essential economical features of our large plants. Owing to freight conditions and the necessity for localizing certain operations, the

Schaffer Engineering & Equipment Co.

are in a position to offer a real service in connection with the design and installation of lime plants of either large or small capacity. The matter of economy in operation, whether in large or small units, will be paramount for the next several years. Also the necessity of quality as evidenced by Schaffer Engineering and Equipment Company plants is equally important.

Schaffer Engineering & Equipment Co.
2828 Smallman Street **PITTSBURGH, PA.**



View in a cement quarry showing a bank of well broken stone after a deep well-drill blast in which Cordeau-Bickford was used as the detonating agent for the explosive.

USE Cordeau-Bickford Detonating Fuse

For well drill blasting and the tunnel and pocket method of blasting where large quantities of explosive are to be detonated, use safe, efficient Cordeau-Bickford and get lower blasting costs.

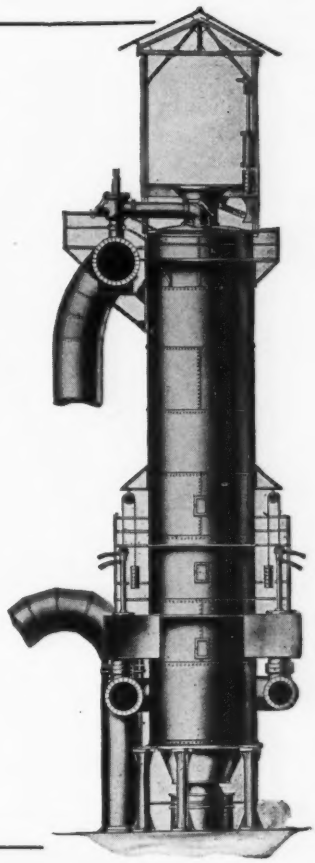
THE ENSIGN-BICKFORD CO., SIMSBURY, CONN.
Established 1836 **Original Makers of Safety Fuse**

Continuous Discharge—Gas Fired

LIME KILNS

The wastefulness of efficiency of any lime burning apparatus is determined by the amount of fuel per ton of lime produced.

Our Kilns are not an experiment, but have successfully met the test of years of actual service. The design is the work of our Consulting Mechanical and Chemical Engineer, who has had many years of practical operative experience. They embody a number of labor saving devices, and are designed to secure maximum production with minimum fuel consumption; their record in this respect should interest every lime producer in the country.

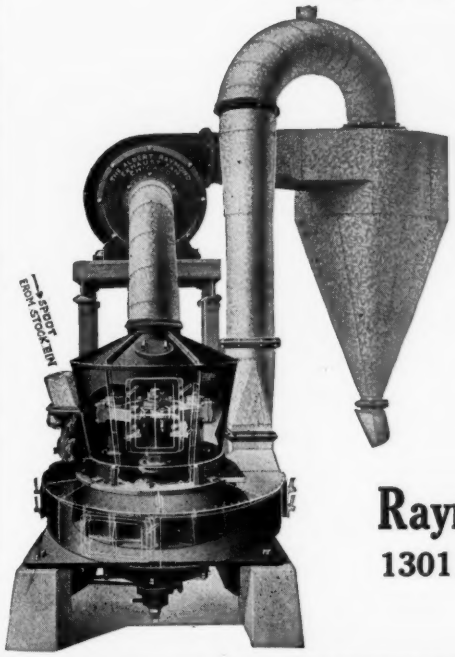


Glamorgan Pipe & Foundry Company

Lynchburg, Va., U. S. A.

Using the Nationally Famous Virginia Foundry Irons

90% of the Fine Powdered Materials used by Industrial Concerns is Produced by the Raymond System



Wherever you go in the industries you will find men who swear by certain powdered products because of their constant uniformity and the ease with which they work into the manufacturing processes.

Those powdered products are almost invariably made by the Raymond System of Pulverizing and Air-Separating.

The outstanding feature of these products is their uniformity of fineness.

Raymond Air-Separation gives this uniformity. Not only that, but the units are complete in every sense of the word because this System takes materials around one inch in size, reduces all of it to powder at a low cost, Air-Separates and delivers the finished material direct to a storage bin without dust.

Why not get full details on your problem today?

Raymond Bros. Impact Pulverizer Company

1301 North Branch Street **Chicago, Ill.**

Western Office: 201 Boston Bldg., Denver, Colo.
Eastern Office: 50 Church St., New York City

FORD EFFICIENCY

We honestly believe this is the most reliable, efficient and economical Gasoline Locomotive on the market

The power unit is the Ford Ton Truck, with overhead worm drive. In conjunction with the Ford unit, we use our special auxiliary reverse transmission, which attachment gives the motor both the Ford high and low speeds running forward or in reverse—a low speed up to 4 miles per hour and a high speed up to 12 miles per hour.

In the matter of economy this machine has no competitor, and where the loads and grades are not excessive, it will do all the work of a $5,000 machine at a fraction of the cost of operation and upkeep.

All gauges, 24" to 56½".

Weight under full ballast from 3,500 to 5,000 lbs.

Write today for full information and list of satisfied users

Brookville Truck & Tractor Company

BROOKVILLE, PA., U. S. A.

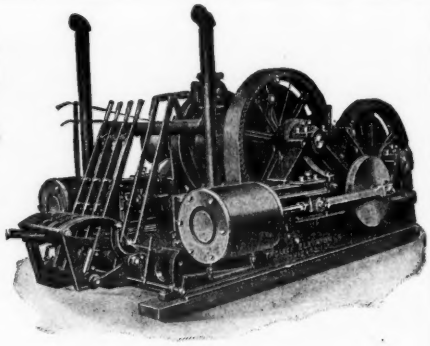
Canadian Distributor: A. R. Woolridge, 220 King St., West, Toronto, Canada Phone Adelaide 3851

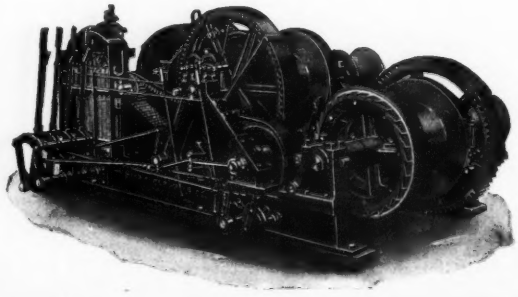
THOMAS HOISTS

Steam and Electric—Single and Two Speed Types

for

Dragline Cableways
Drag Scrapers
Derricks
Bucket Operation
Car Haulage

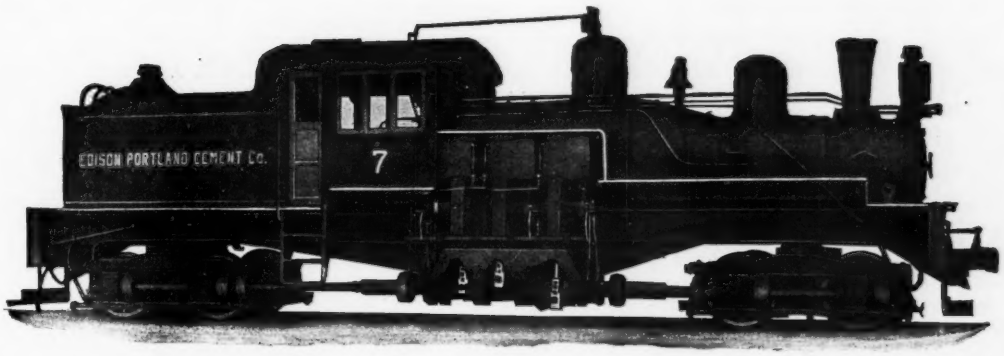




Designed and built to give continuous and dependable service for every requirement of the Sand, Gravel and Stone Producer.

Thomas Elevator Co.

27 South Hoyne Ave. Chicago, Ill.



What do You know about the Shay?

If you had known of the special fitness of the Shay Geared Locomotive for pit, quarry and excavating work, and its many money-saving advantages, it is more than likely you would be using nothing but Shays now.

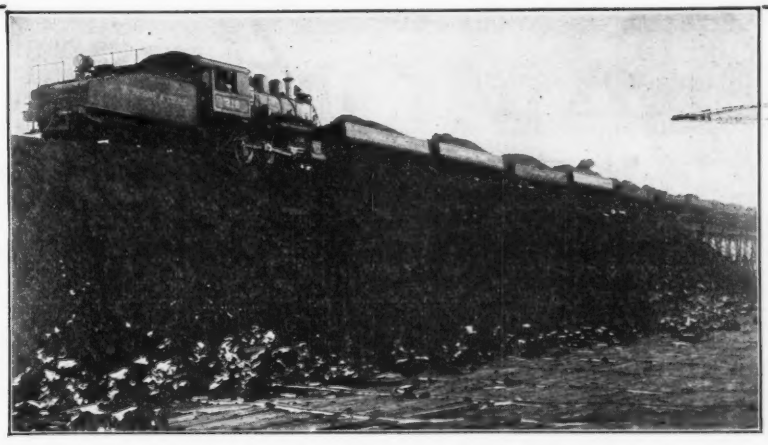
It isn't too late to investigate. We are ready to tell you anything you want to know about the Shay and what Shays are doing in work like yours. This information, together with assistance in the study of your transportation difficulties, will be given freely and cheerfully, regardless of whether or not you are thinking of buying a locomotive just now.

LIMA LOCOMOTIVE WORKS, Incorporated

Lima, Ohio 17 East 42nd St., New York

Baldwin
0-6-0 Type

Gauge, 4'8½"
Cylinders, 20"x26"
Working pressure, 180 pounds
Fuel, coal



Service
Switching

Driving wheels, diameter, 49"
Wheel base, 10' 9"
Weight, engine, 135,000 pounds
Weight, engine and tender, 225,000 pounds.

Baldwin Locomotives for Railroad Contractors

The illustration shows a Baldwin locomotive of the 0-6-0 type operated by A. Guthrie & Co., of St. Paul, Minn., in big construction work.

Where the hauls are generally short and loads heavy, this type is well adapted. These locomotives easily traverse sharp curves, and as the entire weight of the engine is carried on the drivers, they develop a large hauling capacity in proportion to their size.

Large numbers of Baldwin contractors' locomotives, operating under the most difficult conditions, attest to their dependability.

THE BALDWIN LOCOMOTIVE WORKS, PHILADELPHIA

682

CONVEYING MACHINERY

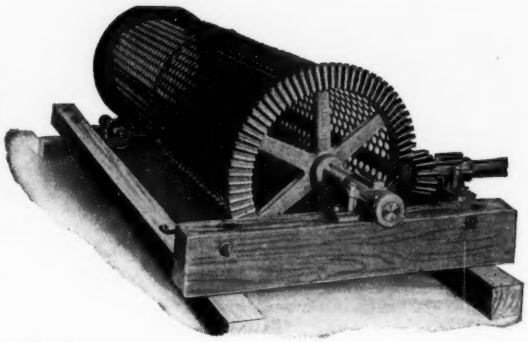
FOR HANDLING

Cement, Coal, Fertilizer, Gravel, Gypsum, Lime, Phosphate, Sand, Crushed Stone, etc.

WILL INCREASE THE OUTPUT AND CUT YOUR EXPENSES

WELLER MADE CHICAGO

Inquiries and Orders Appreciated



WE DESIGN AND MAKE

Apron Conveyors	Spiral Conveyors	Steel Storage Bins	Screens
Belt Conveyors	Bucket Elevators	Bin Gates	Steel Chain
Drag Conveyors	Elevator Buckets	Car Pullers	Combination Chain
Chain Conveyors	Portable Elevators	Power Shovels	Sprockets, Gears, Etc.

WELLER MANUFACTURING CO.

1820-1856 North Kostner Avenue Chicago, Illinois

SALES OFFICES:

New York Boston Baltimore Pittsburgh Cleveland San Francisco Salt Lake City

PLAMONDON
TRANSMISSION MACHINERY

Dust Proof Friction Clutches—

The continuous friction surfaces of the Plamondon Disc Type Friction Clutch, consists of but three parts, with all the simple mechanism for adjusting and operating on the outside in plain view.

No part is affected by centrifugal action—they can be run at high speed with safety, and without loss of efficiency. The adjustment for wear is made entirely by means of one adjusting collar, which gives a uniform pressure on all parts of the friction surfaces. These surfaces are absolutely dust proof, and are universally used by leading cement mills.

Our products also consist of Heavy Gearing, Cut Gears and Machine Molded Gears of all kinds—Shafting, Pulleys, Hangers, Couplings, Collars, Pillow Blocks, Worm-Wheels, Fly-Wheels, Rope Sheaves, Grey Iron and Semisteel Castings by analysis.

We Solicit Inquiries

A. PLAMONDON MANUFACTURING CO.

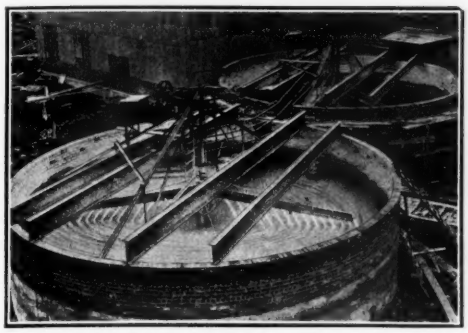
Engineers, Founders, and Machinists

Established 1859 — Incorporated 1877

Works and Main Office: 5301 South Western Boulevard, Chicago, Illinois

EMERGENCY ORDERS RECEIVE SPECIAL ATTENTION

Dorr Slurry Mixers



More Evidence

"We have installed two Dorr Slurry Mixers to agitate slurry in our correction tanks. The tanks are 40′ in diameter and 14′ deep, and are in constant use. The water content varies very little, and the chemical analyses show a highly satisfactory mixture the uniformity of which is most gratifying.

"The results from these mixers are all that anyone could ask in handling slurry."

BESSEMER LIMESTONE & CEMENT CO.
F. R. Kanengeiser
Vice-President and Gen'l Mgr.

Tests in several plants have shown that these results are being obtained with only 20% of the power required by purely mechanical agitators and in about one-half the time.

Let us tell you what these mixers can do in *your* plant.

The Dorr Company
Engineers

101 Park Avenue

Denver New York London

RESEARCH TESTS DESIGN EQUIPMENT

ATLAS EXPLOSIVES
USED ON BIG JOBS EVERYWHERE

Thawing kettles and the thawing house, once indispensable factors in the use of high explosives, now are things of the past on operations where Atlas Non-Freezing is used. Furthermore, the "powder headache," so common with the handling of ordinary high explosives, is UNKNOWN where this super-explosive is employed. Tell us what explosive you now are using and we will tell you what grade of Atlas Non-Freezing will do YOUR work.

ATLAS POWDER COMPANY
WILMINGTON, DEL.

Branch Offices: — Allentown, Pa.; Birmingham, Ala.; Boston; Chicago; Houghton, Mich.; Joplin, Mo.; Kansas City; Knoxville; McAlester, Okla.; Mexico City, Mexico; New Orleans; New York; Philadelphia; Pittsburg, Kans.; Pittsburgh, Pa.; Pottsville, Pa.; St. Louis; Wilkes-Barre.

Buyers' Directory
of the Rock Products Industry
Classified Directory of Advertisers in Rock Products

AERIAL TRAMWAYS
Interstate Equip. Co., New York, N. Y.

AUTOMATIC WEIGHERS
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY
Bates Valve Bag Co., Chicago, Ill.
Jaite Co., The, Jaite, Ohio.
Valve Bag Co. of America, Toledo, Ohio.

BARRELS—Lime
Draper Mfg. Co., The, Cleveland, Ohio.
International Cooperage Co., Niagara Falls, N. Y.
Sandusky Cooperage & Lbr. Co., Toledo, Ohio.

BELTING
New York Belting & Packing Co., New York, N. Y.

BINS
Neff & Fry, Camden, Ohio (concrete stone)
Weller Mfg. Co., Chicago, Ill. (storage)

BIN GATES
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bacon, Earle C., Inc., New York City.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

BOILERS, WASTE, HEAT
Edge Moor Iron Co., Edge Moor, Del.
Freeman Mfg. Co., Racine, Wis.

BRICK MACHINERY
Besser Sales Co., Chicago, Ill.
Shope Brick Co., Portland, Ore.

BUCKETS—Elevator
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, O.
Orton & Steinbrenner, Chicago, Ill.

BUCKETS
Blaw-Knox Co., Pittsburgh, Pa.
Browning Co., Cleveland, Ohio.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.
Williams Co., G. H., Erie, Pa.

CABLEWAYS
Blaw-Knox Co., Pittsburgh, Pa.
S. Flory Mfg. Co., Bangor, Pa.
Interstate Equip. Co., New York, N. Y.

CALCINING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

CARS—Quarry and Industrial
Atlas Car & Mfg. Co., Cleveland, Ohio.
Easton Car & Constr. Co., Easton, Pa.
Gehret Bros., Bridgeport, Pa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

CAR PULLERS
Weller Mfg. Co., Chicago, Ill.

CASTINGS—Alloy, Steel and Malleable Iron
Inland Engineering Co., Chicago, Ill.

CEMENT MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., N. Y. City.

CEMENT MILL REPAIRS
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CHAINS—Malleable (All Types)
Inland Engineering Co., Chicago.

COMPRESSORS, AIR
Ingersoll-Rand Co., N. Y. City.

CONVEYORS AND ELEVATORS
Caldwell, H. W., & Son Co., Chicago, Ill.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.

CRANES—Locomotive Gantry
Ball Engine Co., Erie, Pa.
Brown Hoisting Machinery Co., The, Cleveland, Ohio.
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Pulverizer Co., St. Louis, Mo.
Austin Mfg. Co., Chicago, Ill.
Bacon, Earle C., Inc., New York, N. Y.
Buchanan Co., Inc., C. G., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Machinery Co., Kennett Square, Pa.
Gruendler Pat. Crusher Co., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Kaltenthaler, H. J., Philadelphia, Pa.
K. B. Pulverizer Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.
Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Munson Mill Machinery Co., Utica, N. Y.
New Holland Machine Co., New Holland, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.

CRUSHER REPAIRS—Manganese Steel
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

CLUTCHES
Weller Mfg. Co., Chicago, Ill.

DERRICKS
Terry Mfg. Co., New York, N. Y.

DIPPER TEETH
American Manganese Steel Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

DREDGING MACHINERY
S. Flory Mfg. Co., Bangor, Pa.

DRILLS
The Loomis Machine Co., Tiffin, Ohio.
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

DRILLERS
Pennsylvania Drilling Co., Pittsburgh, Pa.

DRYERS
American Process Co., New York City.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DYNAMITE
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

ENGINES—Steam
Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS
Arnold & Weigel, Woodville, Ohio.
Artingstall, S. G., Jr., Chicago, Ill.
Austin Co., The, Cleveland, Ohio.
Bacon, Earle C., Inc., New York, N. Y.
Buckbee Co., J. C., Chicago, Ill.
Ehrsam & Sons Co., J. B., Enterprise, Kans.
Federal Bridge & Structural Steel Co., Waukesha, Wis.
Fuller Engineering Co., Allentown, Pa.
James N. Hatch, Chicago, Ill.
R. W. Hunt & Co., Chicago, Ill.
Randolph-Perkins Co., Chicago, Ill.
Smidth & Co., F. L., New York, N. Y.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Webster Mfg. Co., Chicago, Ill.

EXCAVATORS
Ball Engine Co., Erie, Pa.
Erie Steam Shovel Co., Erie, Pa.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

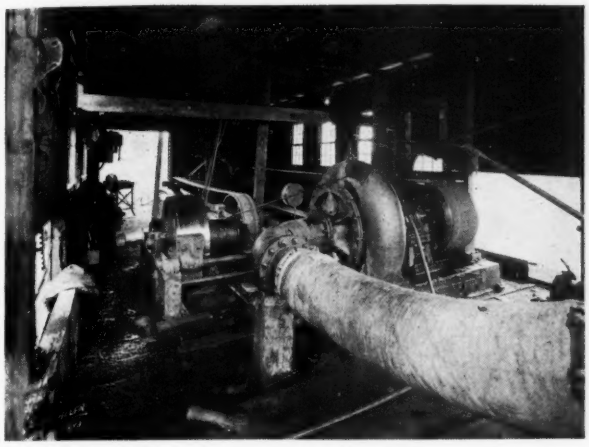
EXPLOSIVES
Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

FUSES
Ensign-Bickford Co., Simsbury, Conn.

(Continued on page 76)

AMSCO

PUMPS



The frequent receipt of enthusiastic letters from users of the Amsco simply confirms our belief that we have the most durable and most economical pump on the market.

The user is always our biggest "booster."

INDEPENDENT SAND & GRAVEL CO.
Des Moines, Iowa, August 20, 1921.

"Our Manganese Steel Pump is now on its third season of service and to date we have not had five cents expense on the pump.

"This season approximately five hundred cars of materials have been shipped from this pump besides probably this number of cars of superfluous sand have been run back into the river.

"We can recommend the pump to anybody and are glad to have an opportunity to boost this American Manganese Steel Company product, the only piece of machinery of their make which we have tried."

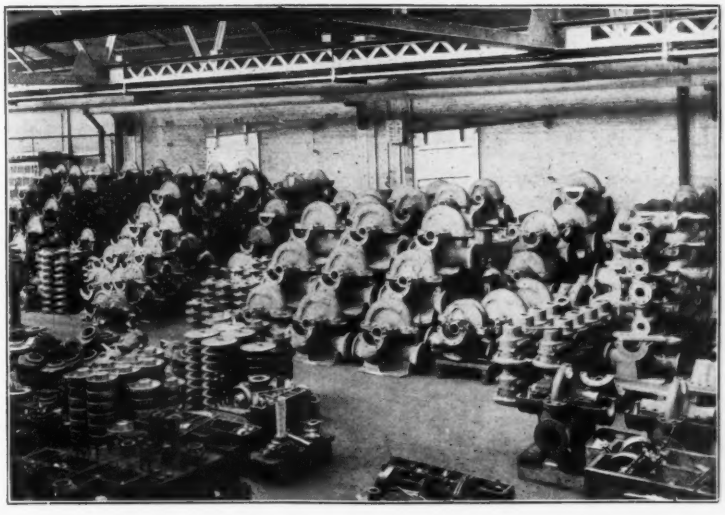
American Manganese Steel Company

General Offices: 1872 McCormick Building, Chicago

Western Sales Office: Newhouse Bldg., Salt Lake City
Pacific Coast Office: Insurance Exchange Bldg., San Francisco, California
Eastern Sales Office: Hudson Term. Bldg., N. Y.
Foundries: Chicago Heights, Ill.—New Castle, Delaware—Oakland, California

Centrifugal Pumps of Reputation

THOSE responsible for the continuous operation of metallurgical and chemical plants using pumps, will tell you that the only real safety and economy is good pumps. Allis Chalmers combined centrifugal pumping units have long had the stamp of approval by prominent engineers and are an important factor in handling liquids in many industries. A line will bring you our catalogue No. 1632-E.H.



Stockroom of Standard Pump Parts Ready for Assembly on Customers' Orders to Suit Particular Requirements

ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Buyers' Directory
of the Rock Products Industry
Classified Directory of Advertisers in Rock Products

(Continued from page 74)

GAS PRODUCERS
Morgan Construction Co., Worcester, Mass.

GEARS
Caldwell, H. W., & Son Co., Chicago, Ill.
Plamondon Mfg. Co., Chicago, Ill.

GLASS SAND EQUIPMENT
Lewistown Fdy. & Mach. Co., Lewistown, Pa.

GRATES
The Kramer Bros. Fdy. Co., Dayton, Ohio.

GRINDING MILLS
Munson Mill Machinery Co., Utica, N. Y.

HOISTS
Flory Mfg. Co., S., Bangor, Pa.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE—Water, Steam, Air Drill, Pneumatic Tool
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Ingersoll-Rand Co., New York City.
N. Y. Belting & Packing Co., New York, N. Y.

HYDRATING MACHINERY
Atlas Car & Mfg. Co., Cleveland, Ohio.
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES
Morris Machine Works, Baldwinsville, N. Y.

LIME HANDLING EQUIPMENT
Weller Mfg. Co., Chicago, Ill.

LIME KILNS
Arnold & Wiegel, Woodville, Ohio.
Glamorgan Pipe & Fdy. Co., Lynchburg, Va.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS
Ball Engine Co., Erie, Pa.
Erie Steam Shovel Co., Erie, Pa.
Haiss Mfg. Co., The Geo., New York City.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES
Baldwin Locomotive Works, The, Philadelphia, Pa.
Brookville Truck & Tractor Co., Brookville, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Heisler Locomotive Co., Erie, Pa.
Industrial Equip. Co., Minster, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Lima Locomotive Works, New York, N. Y.
Porter Co., H. K., Pittsburgh, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MOTOR TRUCKS
Packard Motor Car Co., Detroit, Mich.
Pierce-Arrow Motor Car Co., Buffalo, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

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N. Y. Belting & Packing Co., New York, N. Y.

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Williams, C. K., & Co., Easton, Pa.

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Chicago Perforating Co., Chicago, Ill.
Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PIPE JOINTS
Berry Flexible Pipe Joint Co., Philadelphia, Pa.

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Butterworth & Lowe, Grand Rapids, Mich.
Ehrsam & Sons Co., J. B., Enterprise, Kans.

PORTABLE CONVEYORS
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.

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Atlas Powder Co., Wilmington, Del.
Du Pont de Nemours & Co., Inc., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.
Hercules Powder Co., Wilmington, Del.

POWER TRANSMITTING MACHINERY
Caldwell, H. W., & Son Co., Chicago, Ill.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
K. C. Hay Press & Tractor Co., Kansas City, Mo.
Morris Machine Works, Baldwinsville, N. Y.
Traylor Eng. & Mfg. Co., Allentown, Pa.

PULLEYS
Weller Mfg. Co., Chicago, Ill.

PULVERIZED FUEL EQUIPMENT
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Raymond Bros. Impact Pulv. Co., Chicago, Ill.

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N. Y. Belting & Packing Co., New York, N. Y.

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Universal Road Mach. Co., Kingston, N. Y.

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American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

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Pulmosan Safety Equipment Co., Brooklyn, N. Y.

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Green, L. P., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

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Cross Eng. Co., Carbondale, Pa.
Good Roads Machinery Co., Kennett Square, Pa.
Haiss Mfg. Co., Inc., Geo., N. Y. City, N. Y.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Simplex Screen Co., Salt Lake City, Utah.
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Stephens-Adamson Mfg. Co., Aurora, Ill.
Stimpson Equip. Co., Salt Lake City, Utah.
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Universal Road Mach. Co., Kingston, N. Y.
Weller Mfg. Co., Chicago, Ill.

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Orton & Steinbrenner Co., Chicago, Ill.
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Traylor Eng. & Mfg. Co., Allentown, Pa.

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Tyler Co., The W. S., Cleveland, Ohio.

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Interstate Equip. Co., New York, N. Y.

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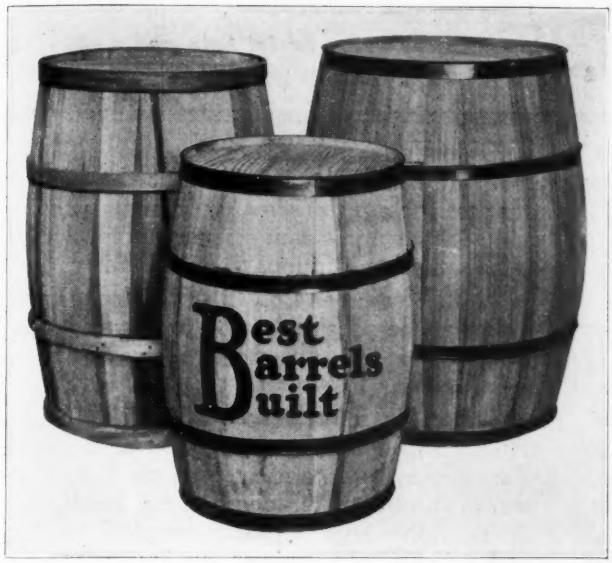

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Buyers' Bulletin

MANUFACTURERS OF MACHINERY AND EQUIPMENT:—These inquiries are live, up-to-date inquiries that have come direct to us from the individual in each case.

READERS OF "ROCK PRODUCTS":—This Department is for your special help and service. If you do not see what you require advertised in "Rock Products," tell us your needs and we will publish them here. There is no charge for this service.

Woodall Bros., P. O. Box 335, Scottsboro, Ala., want quotations on 1000 ft. of small tramcar rail.

P. D. Barnes, Moapa, Nev., is in the market for all equipment necessary for a gypsum quarry—crushers, engines, conveyors, etc., also powder.

H. A. Lockwood, 261 Broadway, N. Y. City, wants prices and data on crusher and pulverizer for agricultural limestone for about 4 to 6 tons per hour. Wants to know horsepower required, price and delivery after order is placed and blue prints or illustrations showing space taken up.

Tolmie & Anderson, 1412 6th St., Rockford, Ill., write us as follows: "Can you please forward us the names of all manufacturers of limestone pulverizers? We are planning to open a pulverized limestone plant this fall and are desirous of purchasing the best pulverizer in the market."

Ohio Valley Sand & Gravel Co., 302 Temple Bldg., Bellaire, O., advise that they are in the market for river dredge equipment; gasoline engine 15-Hp. and steam engine 15-Hp. with boiler. Also, small continuous concrete mixer.

L. J. Alexander Co., 8th St., Napa, Calif., advise that they desire data on pneumatic rock drills and various kinds of drills. They quarry a hard basalt rock.

John H. Ruckman, Consulting Geologist, Room 509 Stock Exchange Bldg., Philadelphia, Pa., wishes to obtain catalogs on the following: steam shovels, cars, locomotives, track, bins and gates, conveyors, dryers, magnetic separators, pulverizers and bagging machines.

William E. Shea, Mgr., Canteras El Palenque, Taguayabon, Cuba, advises that he wants prices and data on the purchase and installation of a complete cement manufacturing plant.

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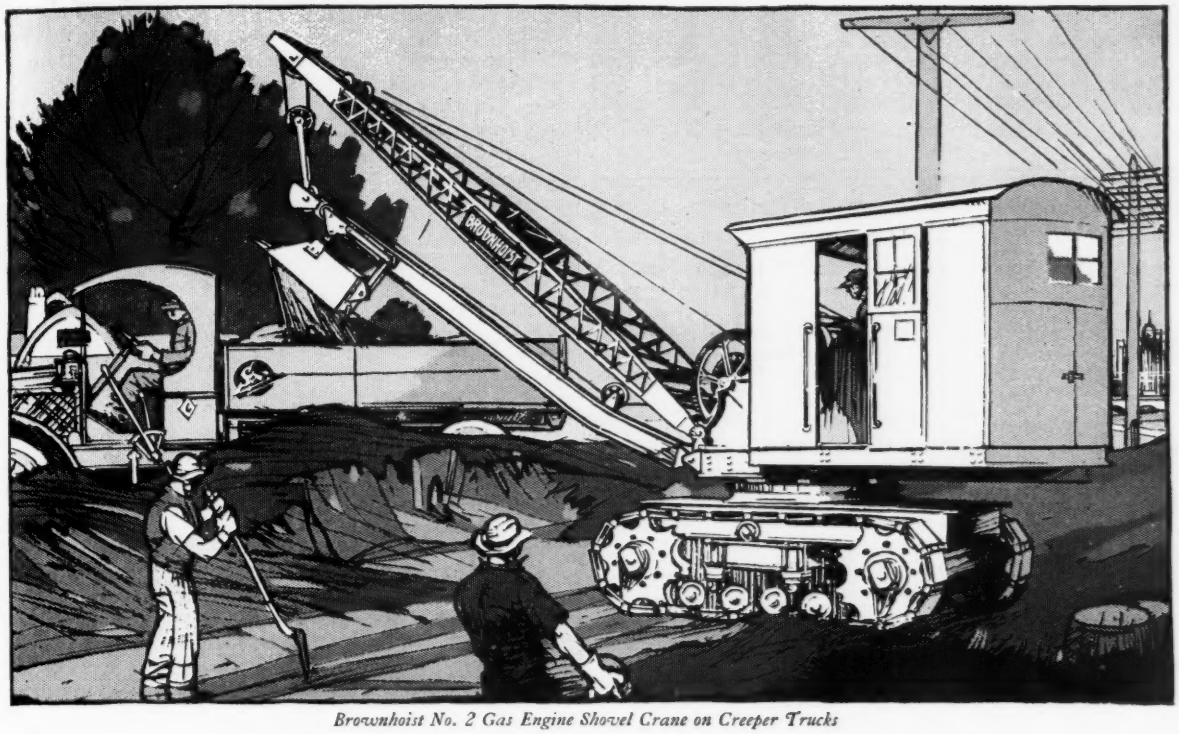

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